## 5.2 AIR QUALITY

The proposed project consists of the addition of one simple-cycle General Electric 7FA natural gas-fired combustion turbine generator (CTG) at the Pastoria Energy Facility near Tejon Ranch in Kern County. The currently permitted facility includes three natural gas-fired combustion turbine generators (CTGs), each with a heat recovery steam generator (HRSG); two steam turbines; a 16-cell cooling tower; a 161 MMBtu/hr auxiliary boiler; a 436 hp Diesel-fired emergency IC engine powering a water pump; a 1529 hp natural gas-fired emergency IC engine powering a 1100 kW generator; and associated facilities. The nominal plant output will be increased from the current nominal rating of 750 MW to a total of 910 MW by the addition of the fourth CTG.

As discussed in Section 1, the PEF Expansion will be accommodated entirely within the existing PEF site with minimal changes to the existing 750 MW plant. The existing 750 MW facility has sufficient fuel gas supply, water supply and treatment, electric transmission capacity, and cooling capacity to handle the addition of the simple-cycle CTG without physical modifications. Site access will be from existing roadways.

This section of the AFC describes existing air quality conditions, maximum potential impacts from the project, and mitigation measures that keep these impacts below thresholds of significance. The project will use the latest, most efficient generation technology to generate electricity in a manner that will minimize the amount of fuel needed, emissions of criteria pollutants, and potential effects on ambient air quality.

Other beneficial environmental aspects of the project that minimize adverse air quality include the following:

- Clean-burning natural gas as fuel
- Selective catalytic reduction (SCR) and dry low-$NO_x$ combustors to minimize $NO_x$ emissions
- An appropriately sized exhaust stack to reduce ground-level concentrations of exhaust constituents

This section presents the methodology and results of the air quality analyses performed to assess potential impacts associated with air emissions from project. Potential public health risks posed by emissions of non-criteria pollutants are also addressed in Section 5.16 (Public Health).

Section 5.2.1 presents the air quality setting, including geography, topography, climate and meteorology. Section 5.2.2 provides an overview of air quality standards and health effects. Section 5.2.3 discusses the criteria pollutants and existing air quality in the vicinity of the proposed project. The affected environment is analyzed in Section 5.2.4, and air quality regulatory agencies relevant to the project are identified; the Laws, Ordinances, Regulations, and Standards (LORS) that can affect the project and project conformance are also identified in Section 5.2.4. Section 5.2.5 discusses the environmental consequences of emissions from the project and presents an overview of approaches for estimating facility impacts, modeling, and analysis. The screening health risk assessment, visibility screening analysis, and construction impacts analysis are also discussed. Section 5.2.6 discusses compliance with LORS applicable to the project. A discussion of cumulative impacts is presented in Section 5.2.7. Mitigation for project air quality impacts is discussed in Section 5.2.8. A list of references used in preparing the section is provided in Section 5.2.9.

## 5.2.1 Air Quality Setting

### 5.2.1.1 Geography and Topography

The PEF project is located on a 31-acre parcel leased from Tejon Ranchcorp, 30 miles south of Bakersfield and 6.5 miles east of Interstate 5 at the base of the Tehachapi Mountains. The project site is at an elevation of approximately 1070 feet above mean sea level. The project site is relatively flat, with a gentle slope running from the southeast to the northwest.

### 5.2.1.2 Climate and Meteorology

The climate of the San Joaquin Valley is characterized by hot summers, mild winters, and small amounts of precipitation. The major climatic controls in the Valley are the mountains on three sides and the semipermanent Pacific High pressure system over the eastern Pacific Ocean. The Great Basin High pressure system to the east also affects the Valley, primarily during the winter months. These synoptic scale influences result in distinct seasonal weather characteristics, as discussed below.

The Pacific High is a semipermanent subtropical high pressure system located off the Pacific Coast. It is centered between the 140°W and 150°W meridians, and oscillates in a north-south direction seasonally. During the summer, it moves northward and dominates the regional climate, producing persistent temperature inversions and a predominantly southwesterly wind field. Clear skies, high temperatures, and low humidity characterize this season. Very little precipitation occurs during summer months, because migrating storm systems are blocked by the Pacific High. Occasionally, however, tropical air moves into the area and thunderstorms may occur over the adjacent mountains.

In the fall, the Pacific High weakens and shifts southwestward toward Hawaii, and its dominance is diminished in the San Joaquin Valley. During the transition period, the storm belt and zone of strong westerly winds also moves southward into California. The prevailing weather patterns during this time of year include storm periods with rain and gusty winds, clear weather that can occur after a storm or because of the Great Basin High pressure area, or persistent fog caused by temperature inversion. The annual rainfall in the Bakersfield area is only 5.7 inches. In between storms, high pressure from the Great Basin High can block storms and result in persistent tule fog caused by temperature inversions. Daily maximums during the December-January months are a relatively mild 57 °F, with lows averaging 38 °F.

Temperature, wind speed, and direction data have been recorded at a meteorological monitoring station at the Bakersfield – California Avenue monitoring station. The average July temperature is over 98 °F; winter temperatures average 47 °F in January. The annual average temperature is 65 °F.[1]

Air quality is determined primarily by the type and amount of pollutants emitted into the atmosphere, the topography of the air basin, and local meteorological conditions. In the Project area, stable atmospheric conditions and light winds can provide conditions for pollutants to accumulate in the air basin when emissions are produced. The predominant winds in California are shown in Figures 5.2-1 through 5.2-4. As indicated in the Figures, winds in California generally are light and easterly in the winter, but strong and westerly in the spring, summer, and fall.

Wind patterns at the project site can be seen in Figures 5.2-5a through 5.2-5e, which show quarterly and annual wind roses for meteorological data collected at the Bakersfield meteorological station during 1964. Wind frequency distribution tables are provided in the Air Quality Technical Report, Appendix B. These wind roses show that the winds are persistent (less than 1% calm conditions) and, on an annual basis, predominantly from the west through the west-southwest (almost half the time). Winds are predominantly from the north and south during the winter months.

A marine climate influences mixing heights. Often, the base of the inversion is found at the top of a layer of marine air, because of the cooler nature of the marine environment. Inland areas, however, where the marine influence is absent, often experience strong ground-based inversions that inhibit mixing and can result in high pollutant concentrations. Smith, et al, (1984) reported that at Bakersfield, the nearest upper-level meteorological station (located approximately 10 miles east-southeast of the project site), 50th percentile morning mixing heights for the period 1979-80 were on the order of 400 feet (115 meters) in fall, 500 to 600 feet (150 to 175 meters) in summer and winter, and 750 feet (230 meters) in spring. Such low mixing heights trap pollutants. The 50th percentile afternoon mixing heights ranged from 2100 feet (630 meters) in winter to over 3900 feet (over 1200 meters) in spring, summer, and fall. These higher mixing heights provide generally favorable conditions for the dispersion of pollutants.

[1] Greater Bakersfield Chamber of Commerce website, http://www.bakersfieldchamber.org/statistics.asp.

### 5.2.2 Overview of Air Quality Standards

The U.S. Environmental Protection Agency (EPA) has established national ambient air quality standards (NAAQS) for ozone, nitrogen dioxide ($NO_2$), carbon monoxide (CO), sulfur dioxide ($SO_2$), particulate matter with aerodynamic diameter less than or equal to 10 microns ($PM_{10}$), particulate matter with aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$), and airborne lead. Areas with air pollution levels above these standards can be considered "nonattainment areas" subject to planning and pollution control requirements that are more stringent than standard requirements.

In addition, the California Air Resources Board (CARB) has established standards for ozone, CO, $NO_2$, $SO_2$, sulfates, $PM_{10}$, airborne lead, hydrogen sulfide, and vinyl chloride at levels designed to protect the most sensitive members of the population, particularly children, the elderly, and people who suffer from lung or heart diseases.

Both state and national air quality standards consist of two parts: an allowable concentration of a pollutant, and an averaging time over which the concentration is to be measured. Allowable concentrations are based on the results of studies of the effects of the pollutants on human health, crops and vegetation, and, in some cases, damage to paint and other materials. The averaging times are based on whether the damage caused by the pollutant is more likely to occur during exposures to a high concentration for a short time (one hour, for instance), or to a relatively lower average concentration over a longer period (8 hours, 24 hours, or 1 month). For some pollutants there is more than one air quality standard, reflecting both short-term and long-term effects. Table 5.2-1 presents the NAAQS and California ambient air quality standards for selected pollutants. The California standards are generally set at concentrations much lower than the federal standards and in some cases have shorter averaging periods.

EPA's new NAAQS for ozone and fine particulate matter went into effect on September 16, 1997. For ozone, the previous one-hour standard of 0.12 ppm was replaced by an eight-hour average standard at a level of 0.08 ppm. Compliance with this standard will be based on the three-year average of the annual 4th-highest daily maximum eight-hour average concentration measured at each monitor within an area. The NAAQS for particulates were revised in several respects. First, compliance with the current 24-hour $PM_{10}$ standard is now based on the 99th percentile of 24-hour concentrations at each monitor within an area. Two new $PM_{2.5}$ standards were added: a standard of 15 $\mu g/m^3$, based on the three-year average of annual arithmetic means from single or multiple monitors (as available); and a standard of 65 $\mu g/m^3$, based on the three-year average of the 98th percentile of 24-hour average concentrations at each monitor within an area. Finally, the state adopted a new, lower annual $PM_{10}$ standard of 20 $\mu g/m^3$.

**FIGURE 5.2-1**
**JANUARY PREDOMINANT MEAN CIRCULATION OF THE SURFACE WINDS**

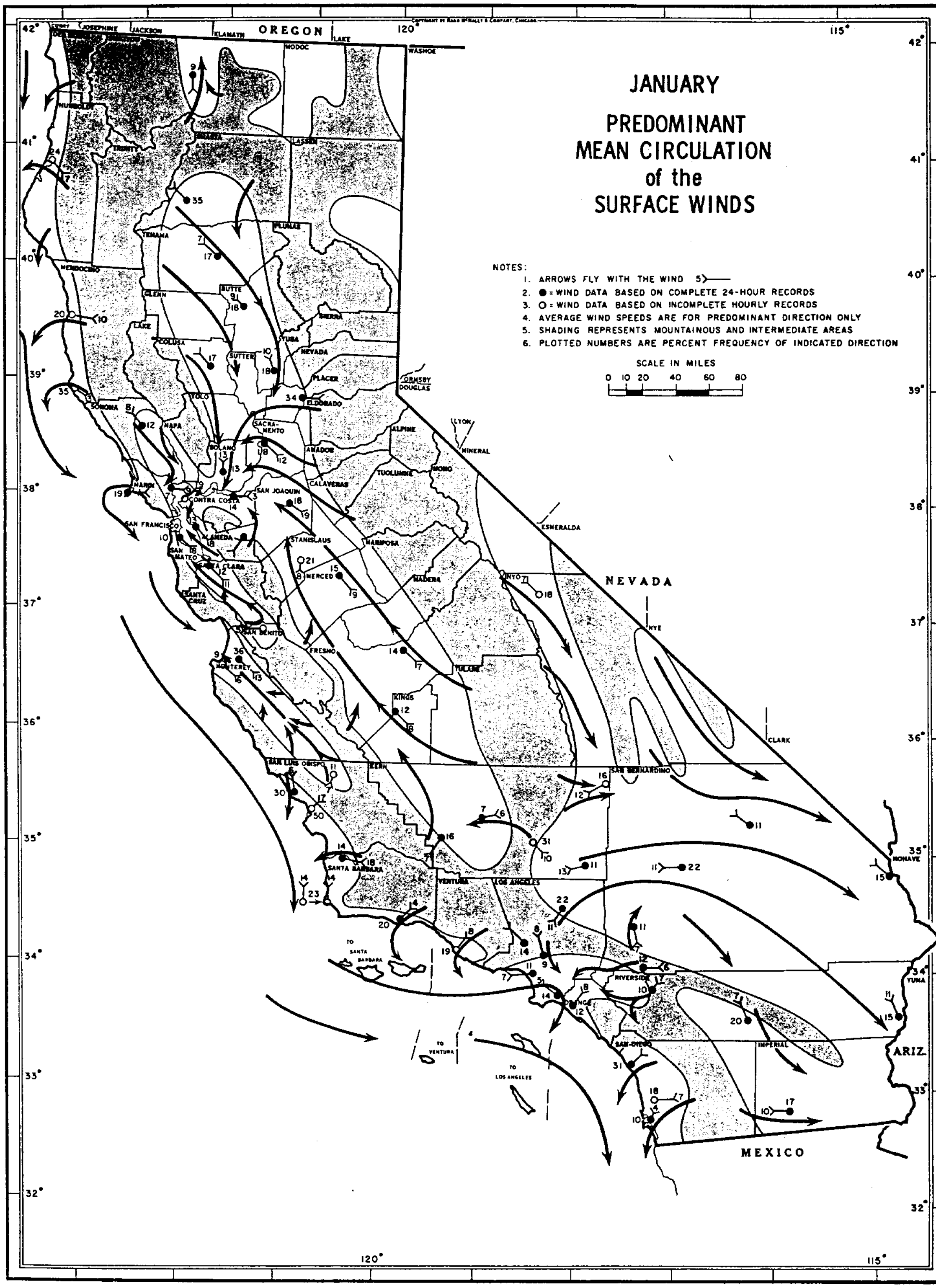
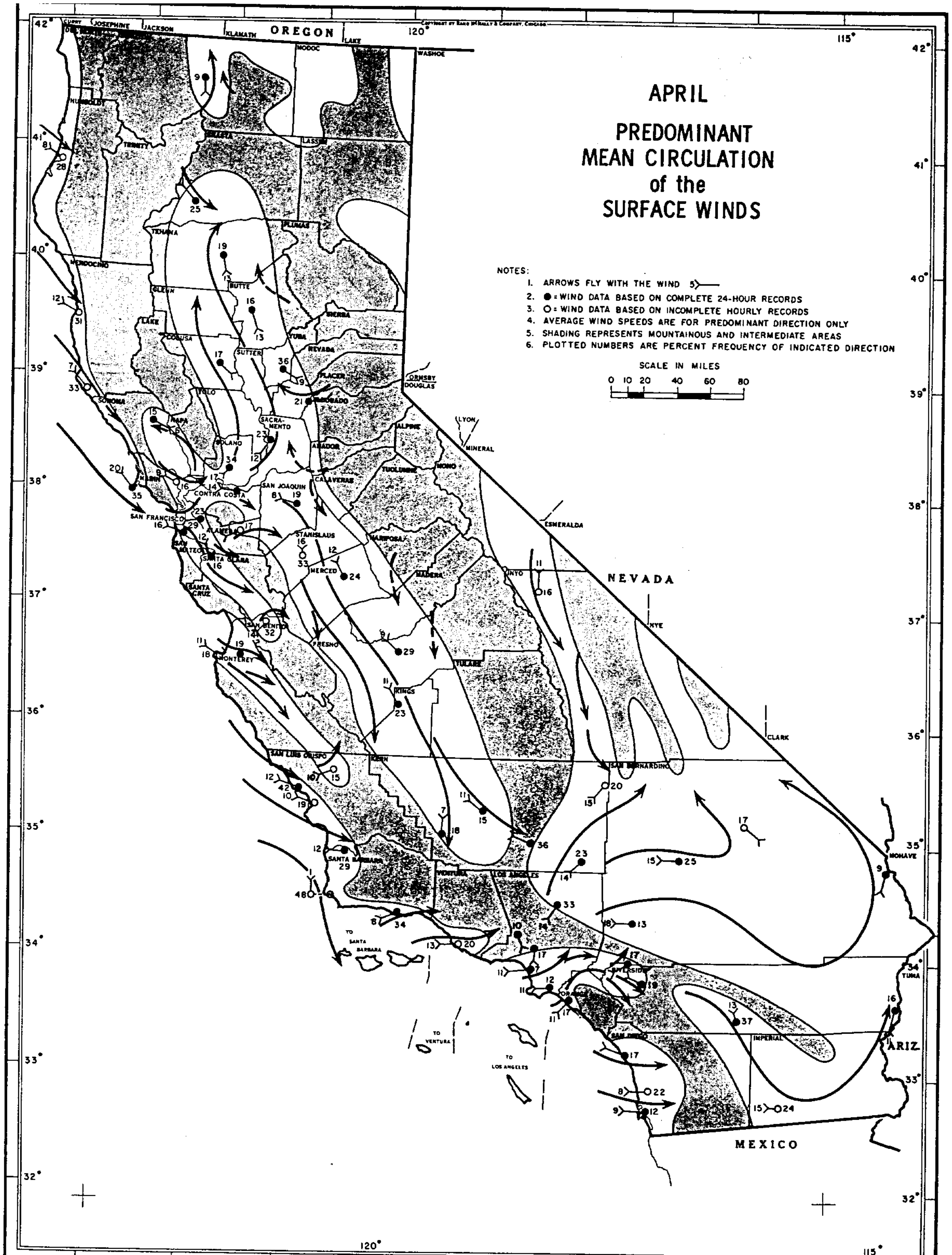
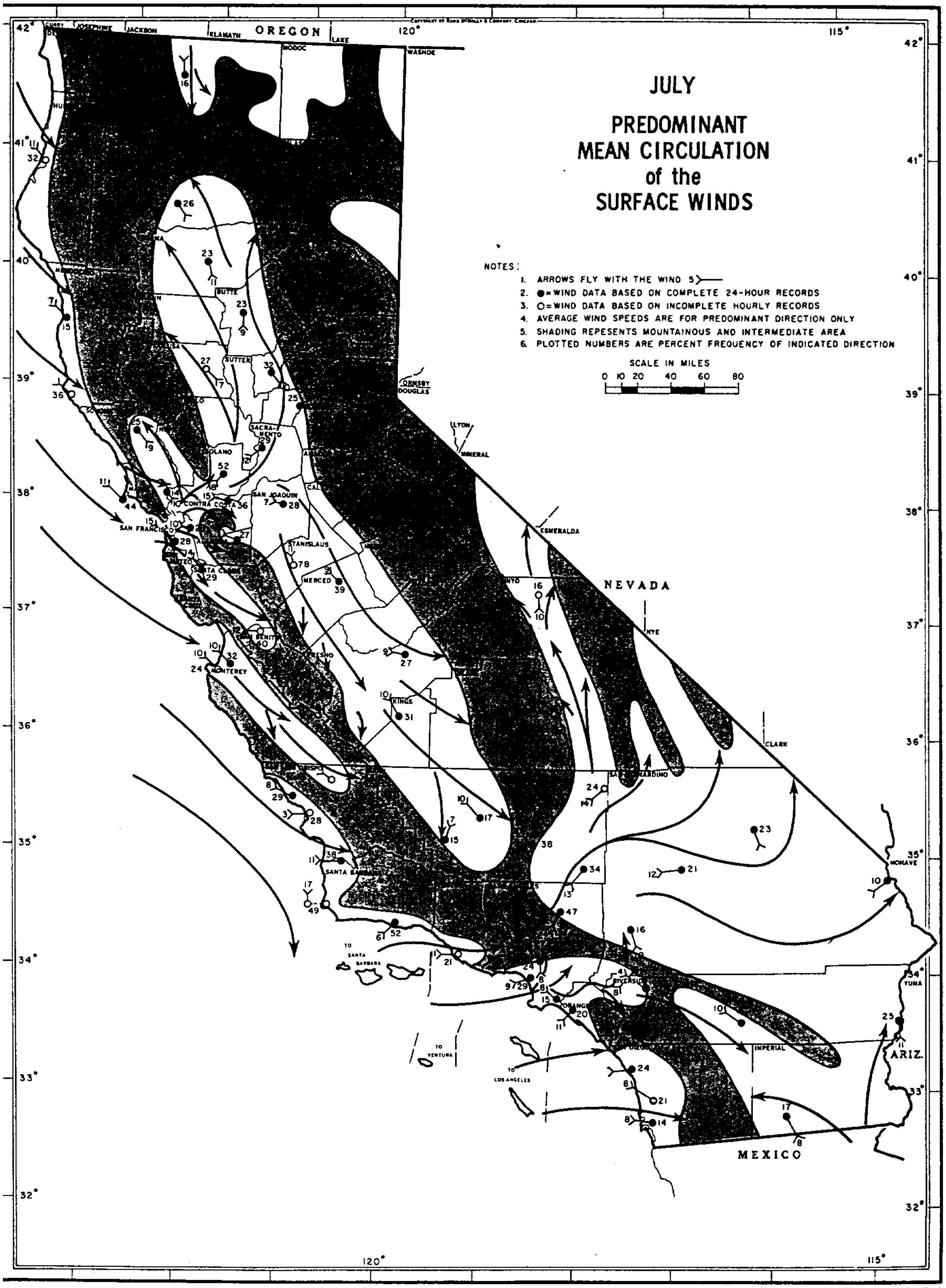


**FIGURE 5.2-2**
**APRIL PREDOMINANT MEAN CIRCULATION OF THE SURFACE WINDS**




C-2238-F-11

**FIGURE 5.2-3**
**JULY PREDOMINANT MEAN CIRCULATION OF THE SURFACE WINDS**



# FIGURE 5.2-4
# OCTOBER PREDOMINANT MEAN CIRCULATION OF THE SURFACE WINDS

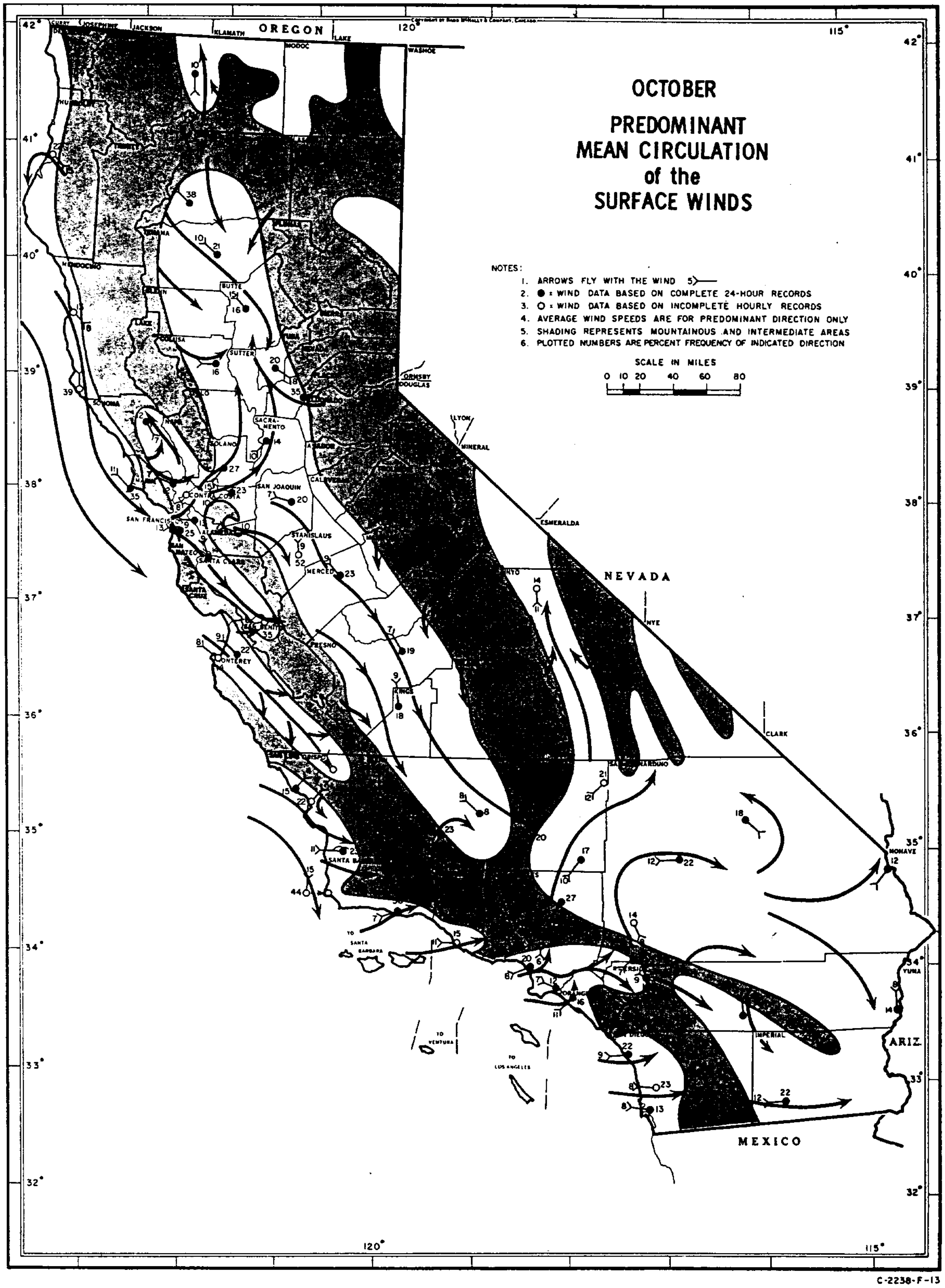


**FIGURE 5.2-5A**
**ANNUAL WIND ROSE 1964**

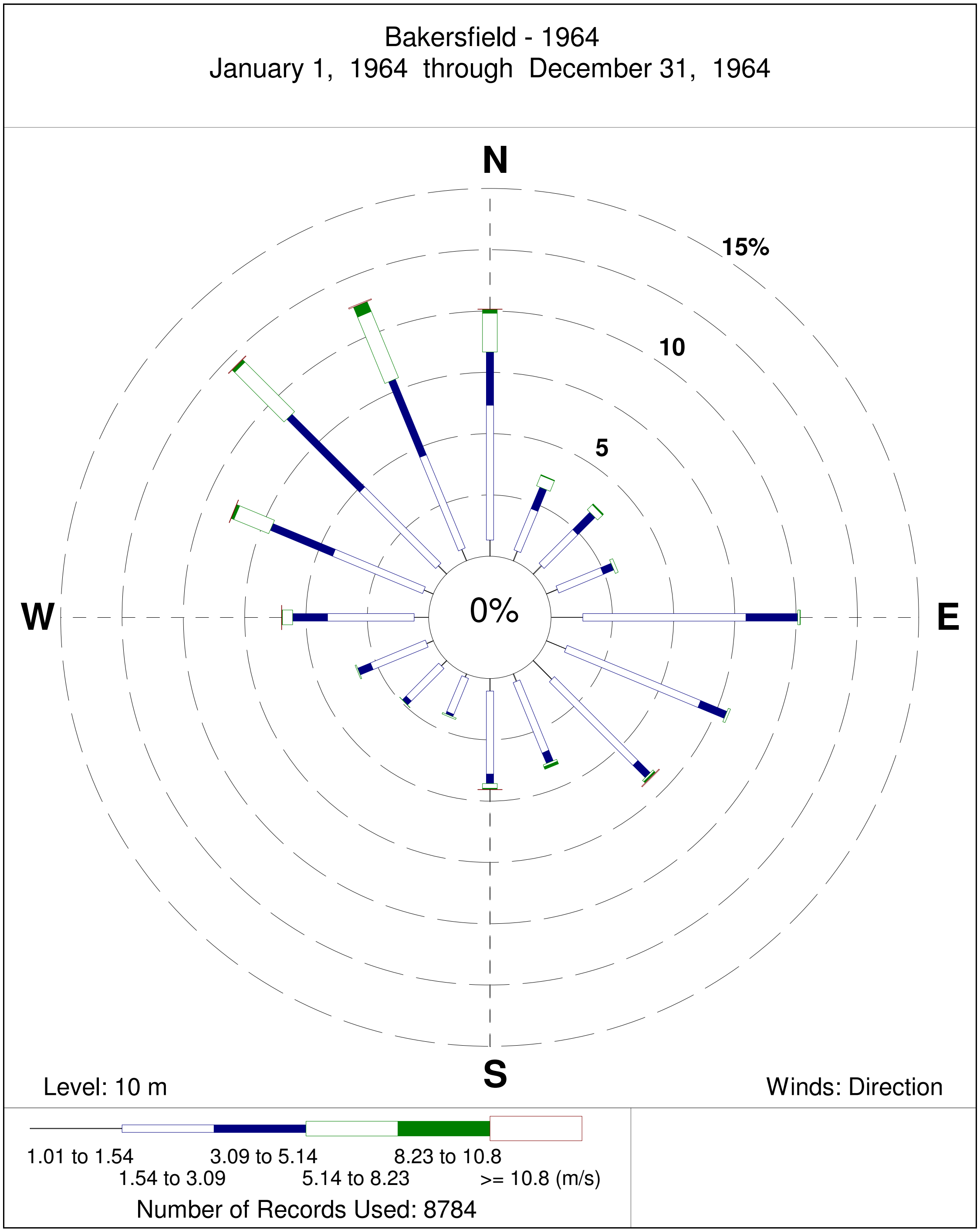


**FIGURE 5.2-5B**
**QUARTERLY WIND ROSE**
**FIRST QUARTER 1964**

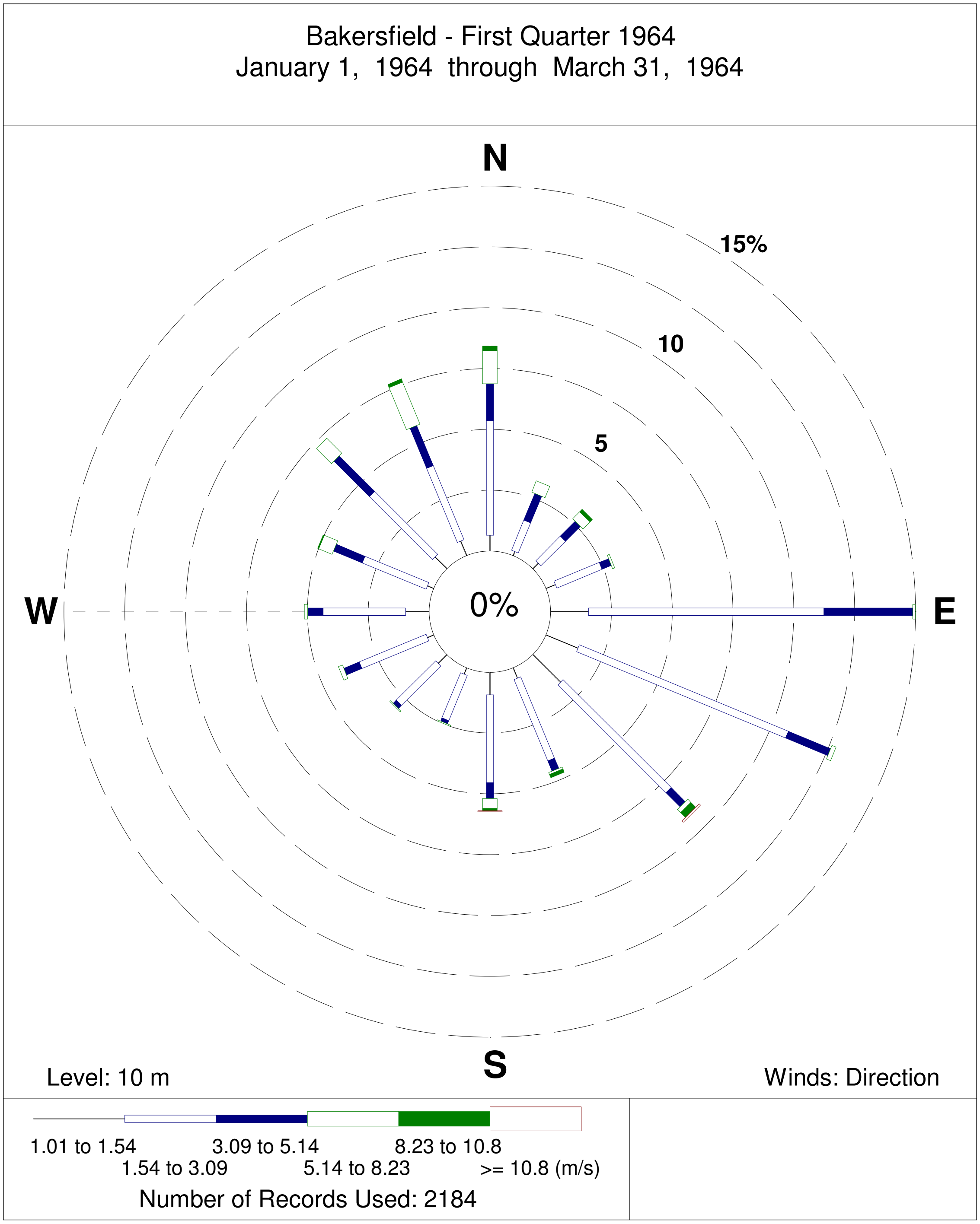


**FIGURE 5.2-5C**
**QUARTERLY WIND ROSE**
**SECOND QUARTER 1964**

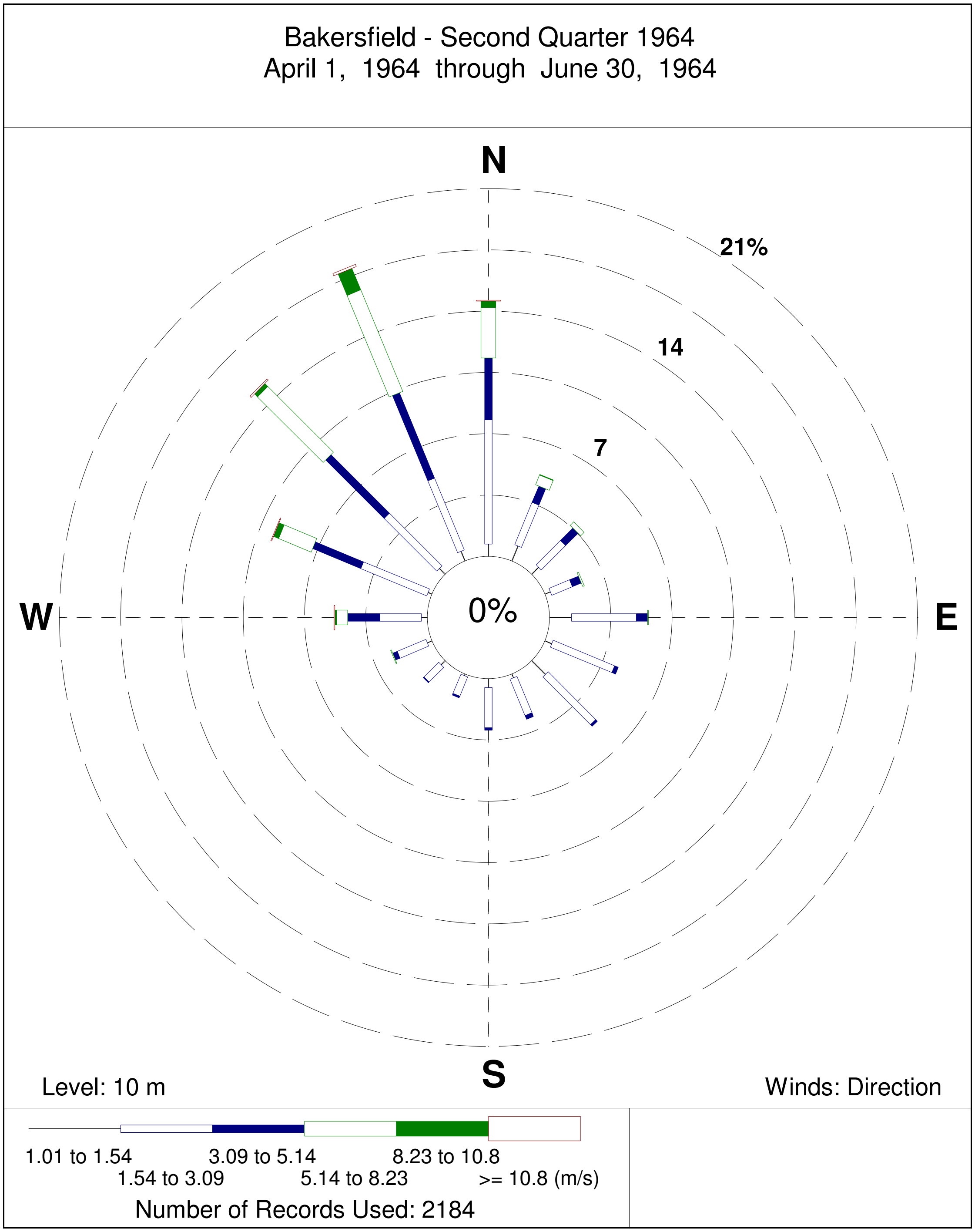


**FIGURE 5.2-5D**
**QUARTERLY WIND ROSE**
**THIRD QUARTER 1964**

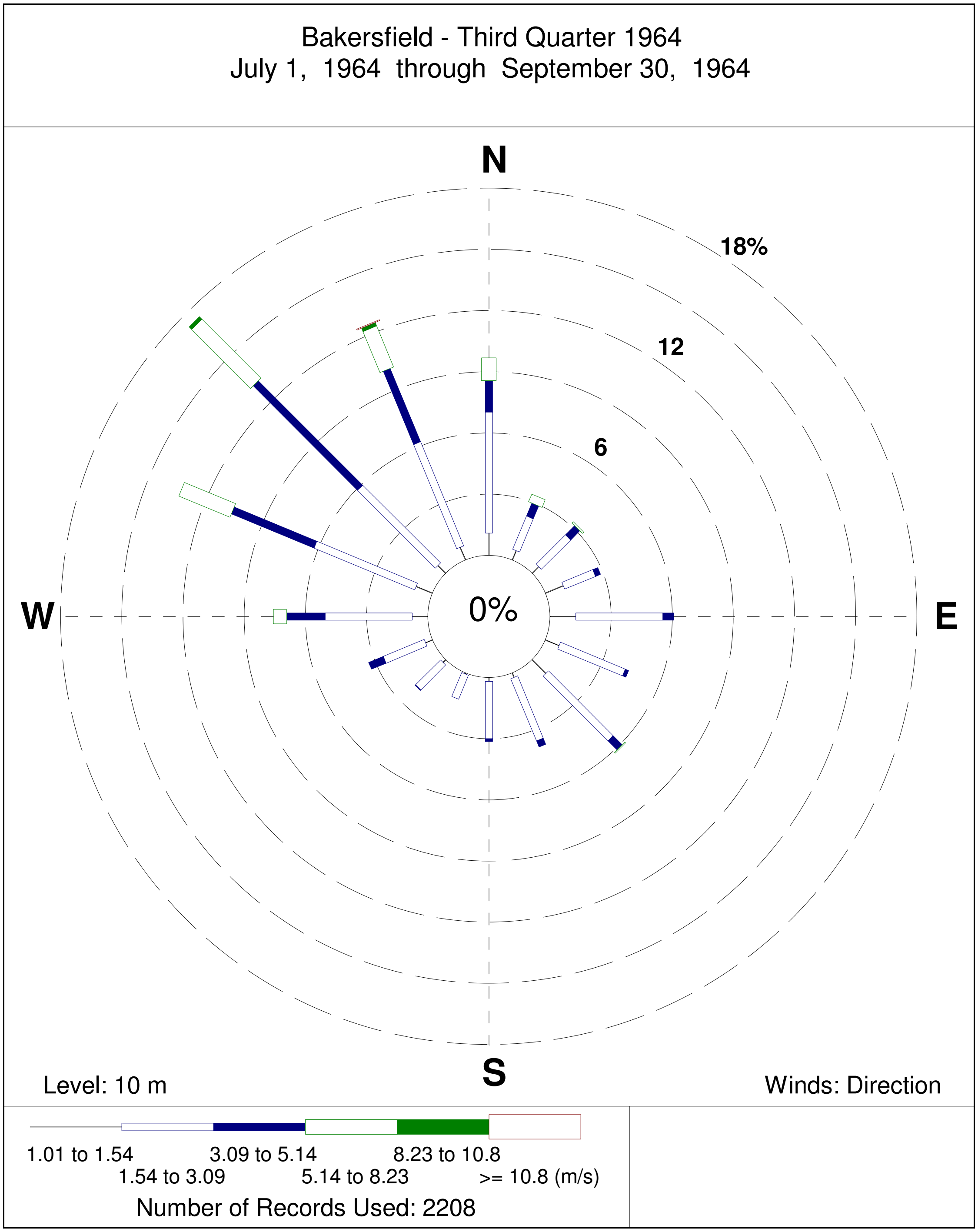


**FIGURE 5.2-5E**
**QUARTERLY WIND ROSE**
**FOURTH QUARTER 1964**

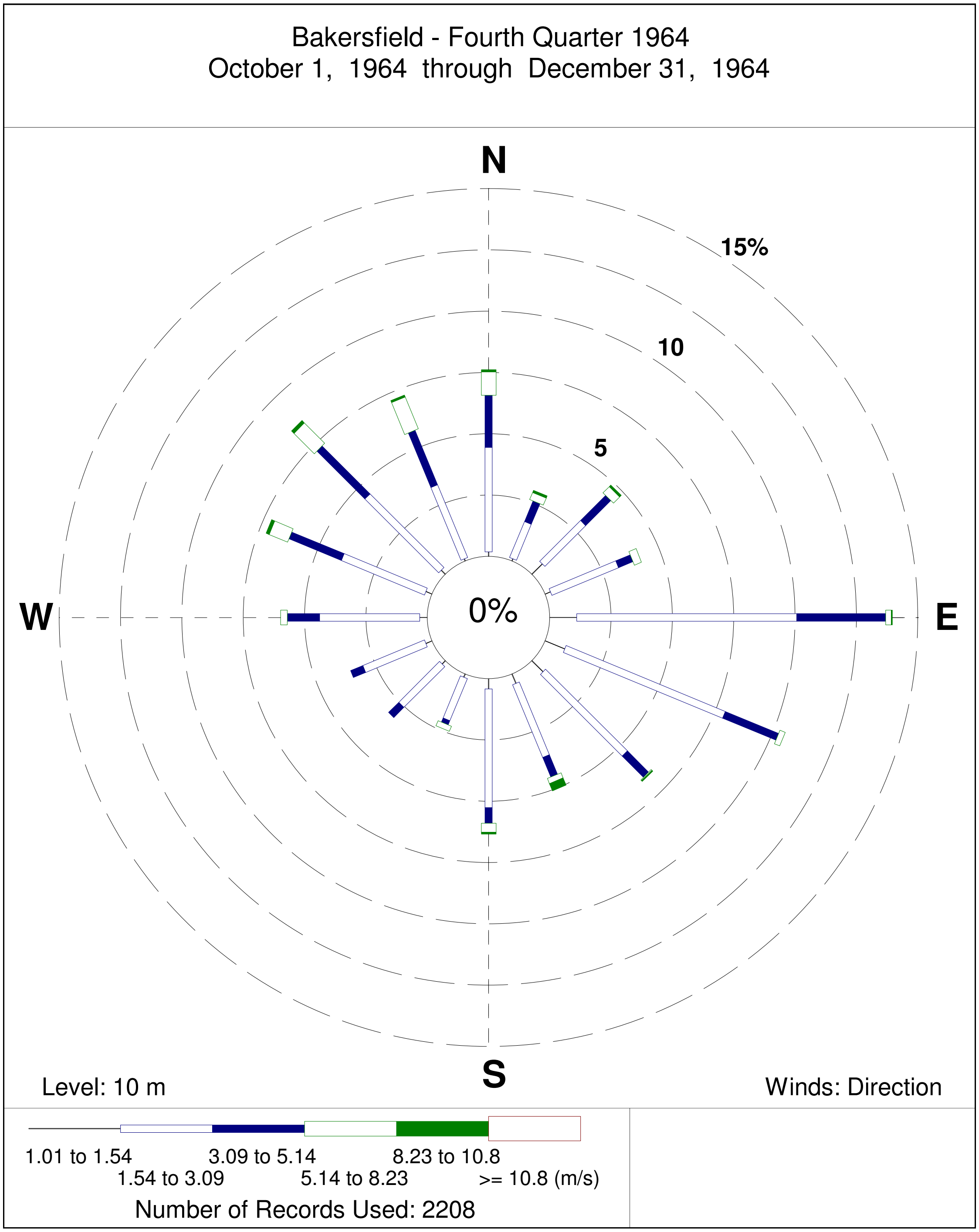


**TABLE 5.2-1**
**AMBIENT AIR QUALITY STANDARDS**

| Pollutant | Averaging Time | California | National |
|---|---|---|---|
| Ozone | 1 hour | 0.09 ppm | 0.12 ppm |
| | 8 hours | - | 0.08 ppm[a] |
| Carbon Monoxide | 8 hours | 9.0 ppm | 9 ppm |
| | 1 hour | 20 ppm | 35 ppm |
| Nitrogen Dioxide | Annual Average | - | 0.053 ppm |
| | 1 hour | 0.25 ppm | - |
| Sulfur Dioxide | Annual Average | - | 80 $\mu g/m^3$ (0.03 ppm) |
| | 24 hours | 0.04 ppm (105 $\mu g/m^3$) | 365 $\mu g/m^3$ (0.14 ppm) |
| | 3 hours | - | 1300[b] $\mu g/m^3$ (0.5 ppm) |
| | 1 hour | 0.25 ppm | - |
| Suspended Particulate Matter (10 Micron) | Annual Arithmetic Mean | 20 $\mu g/m^3$ | 50 $\mu g/m^3$ |
| | 24 hours | 50 $\mu g/m^3$ | 150 $\mu g/m^3$ |
| Suspended Particulate Matter (2.5 Micron) | Annual Arithmetic Mean | 12 $\mu g/m^3$ | 15 $\mu g/m^3$ (3-year average) |
| | 24 hours | - | 65 $\mu g/m^3$[c] |
| Sulfates | 24 hours | 25 $\mu g/m^3$ | - |
| Lead | 30 days | 1.5 $\mu g/m^3$ | - |
| | Calendar Quarter | - | 1.5 $\mu g/m^3$ |
| Hydrogen Sulfide | 1-hour | 0.03 ppm | - |
| Vinyl Chloride | 24-hour | 0.010 ppm | - |
| Visibility Reducing Particles | 8-hour (10am to 6pm PST) | Note d | - |

a. 3-year average of annual 4th-highest daily maximum.
b. This is a national secondary standard, which is designed to protect public welfare.
c. 3-year average of 98th percentiles.
d. Insufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 percent.

### 5.2.3 Existing Air Quality

To characterize existing air quality at the project site, ambient air quality readings were taken from nearby air monitoring stations operated by the ARB. These stations were used because of their proximity to the project site and because they record area-wide ambient conditions rather than the localized impacts of any particular facility.[2] All ambient air quality data presented in this section were taken from CARB and EPA publications and data sources.

### 5.2.3.1 Ozone

Ozone is generated by a complex series of chemical reactions between precursor organic compounds (VOC) and oxides of nitrogen ($NO_x$) in the presence of ultraviolet radiation. Ambient ozone concentrations follow a seasonal pattern: higher in the summertime and lower in the wintertime. At certain times, the general area can provide ideal conditions for the formation of ozone due to the persistent temperature inversions, clear skies, mountain ranges that trap the air mass, and exhaust emissions from millions of vehicles and stationary sources. Based upon ambient air measurements at stations throughout the area, the San Joaquin Valley Air Basin is classified as a severe nonattainment area for the state ozone standard and an extreme nonattainment area for the federal ozone standard.

Maximum ozone concentrations at the Arvin station usually are recorded during the summer months. Table 5.2-2 shows the annual maximum hourly ozone levels recorded at Arvin during the period 1995-2004, as well as the number of days in which the state and federal standards were exceeded.

**TABLE 5.2-2**
**OZONE LEVELS IN KERN COUNTY, ARVIN BEAR MOUNTAIN BOULEVARD MONITORING STATION, 1995-2004 (PPM)**

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|---|---|---|
| Highest 1-Hour Average | 0.151 | 0.164 | 0.134 | 0.151 | 0.130 | 0.145 | 0.134 | 0.151 | 0.156 | 0.155 |
| Highest 8-Hour Average | 0.124 | 0.137 | 0.112 | 0.123 | 0.112 | 0.117 | 0.115 | 0.120 | 0.127 | 0.126 |
| Number of Days Exceeding: | | | | | | | | | | |
| State Standard (0.09 ppm, 1-hour) | 87 | 112 | 57 | 71 | 94 | 82 | 86 | 88 | 121 | 101 |
| Federal Standard (0.12 ppm, 1-hour) | 19 | 37 | 7 | 12 | 9 | 9 | 16 | 15 | 26 | 8 |
| Federal Standard (0.08 ppm, 8-hour) | 80 | 106 | 46 | 64 | 85 | 73 | 81 | 87 | 116 | 103 |

Source: California Air Quality Data, California Air Resources Board website.

[2] A more extensive discussion of why the data from these stations are considered to be representative of air quality in the vicinity of the proposed project is provided in Section 5.2.5.3.1.

The long-term trends of maximum one-hour ozone readings and violations of the state and federal standard are shown in Figure 5.2-6 for the Arvin monitoring station. The data show that, on average, the state and federal ozone air quality standard have been exceeded in the area in the past 10 years. Trends of maximum and 3-year average of the 4$^{th}$ highest daily concentrations of 8-hour average ozone readings and exceedances of the federal standard are shown in Figure 5.2-7. These levels are well above the federal 8-hour average standard. Kern County has been designated a nonattainment area for the eight-hour federal standard.

### 5.2.3.2 Nitrogen Dioxide

Atmospheric $NO_2$ is formed primarily from reactions between nitric oxide (NO) and oxygen or ozone. NO is formed during high temperature combustion processes, when the nitrogen and oxygen in the combustion air combine. Although NO is much less harmful than $NO_2$, it can be converted to $NO_2$ in the atmosphere within a matter of hours, or even minutes, under certain conditions. For purposes of state and federal air quality planning, the SJVAPCD is in attainment for $NO_2$.

Table 5.2-3 shows the long-term trend of maximum one-hour $NO_2$ levels recorded at the Bakersfield California Avenue monitoring station, as well as the annual average level for each of those years. During this period there has not been a single violation of either the state one-hour standard or the NAAQS of 0.053 ppm.

**TABLE 5.2-3**
**NITROGEN DIOXIDE LEVELS IN KERN COUNTY, BAKERSFIELD CALIFORNIA AVENUE MONITORING STATION, 1995-2004 (PPM)**

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|---|---|---|
| Highest 1-Hour Average | 0.109 | 0.099 | 0.081 | 0.084 | 0.107 | 0.089 | 0.115 | 0.107 | 0.085 | 0.083 |
| Annual Average (NAAQS = 0.053 ppm) | 0.022 | 0.023 | 0.022 | 0.022 | 0.025 | 0.024 | 0.022 | 0.021 | 0.020 | 0.019 |
| Number of Days Exceeding: | | | | | | | | | | |
| State Standard (0.25 ppm, 1-hour) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Federal Standard (0.053 ppm, annual arithmetic mean) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Source: California Air Quality Data, California Air Resources Board website.

Figure 5.2-8 shows the historical trend of maximum one-hour $NO_2$ levels at Bakersfield. The $NO_2$ levels are less than one-half of the state standard.

### 5.2.3.3 Carbon Monoxide

CO is a product of inefficient combustion, principally from automobiles and other mobile sources of pollution. In many areas of California, CO emissions from wood-burning stoves and fireplaces can also be measurable contributors to ambient CO levels. Industrial sources typically contribute less than 10 percent of ambient CO levels. Peak CO levels occur typically during winter months, due to a combination of higher emission rates and calm weather conditions with strong, ground-based inversions. Based upon ambient air quality monitoring, Kern County is classified as an attainment area for CO.

Table 5.2-4 shows the California and federal air quality standards for CO, and the maximum one- and eight-hour average levels recorded at the Bakersfield Golden State Highway monitoring station during the period 1995-2004.

**TABLE 5.2-4**
**CARBON MONOXIDE LEVELS IN KERN COUNTY, BAKERSFIELD GOLDEN STATE HIGHWAY MONITORING STATION, 1995-2004 (PPM)**

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|---|---|---|
| Highest 1-hour average | 7.0 | 6.2 | 6.1 | 5.2 | 10.5 | 10.1 | 16.0 | 4.5 | 4.5 | 3.3 |
| Highest 8-hour average | 4.64 | 3.70 | 2.91 | 3.11 | 5.00 | 5.38 | 3.49 | 2.50 | 3.06 | 2.37 |
| Number of days exceeding: | | | | | | | | | | |
| State Standard (20 ppm, 1-hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| State Standard (9.0 ppm, 8-hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Federal Standard (9.3 ppm, 8-hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Source: California Air Quality Data, California Air Resources Board website; USEPA AIRData website.

Trends of maximum one- and eight-hour average CO concentrations are shown in Figures 5.2-9 and 5.2-10, which show that maximum ambient CO levels in Bakersfield have been well below the state standards for many years.

### 5.2.3.4 Sulfur Dioxide

$SO_2$ is produced when any sulfur-containing fuel is burned. It is also emitted by chemical plants that treat or refine sulfur or sulfur-containing chemicals. Natural gas contains negligible sulfur, while fuel oils contain larger amounts. Peak concentrations of $SO_2$ occur at different times of the year in different parts of California, depending on local fuel characteristics, weather, and topography. The San Joaquin Valley Air Basin is considered to be in attainment for $SO_2$ for purposes of state and federal air quality planning.

**FIGURE 5.2-6**
**MAXIMUM HOURLY OZONE LEVELS**
**ARVIN, 1994-2004**

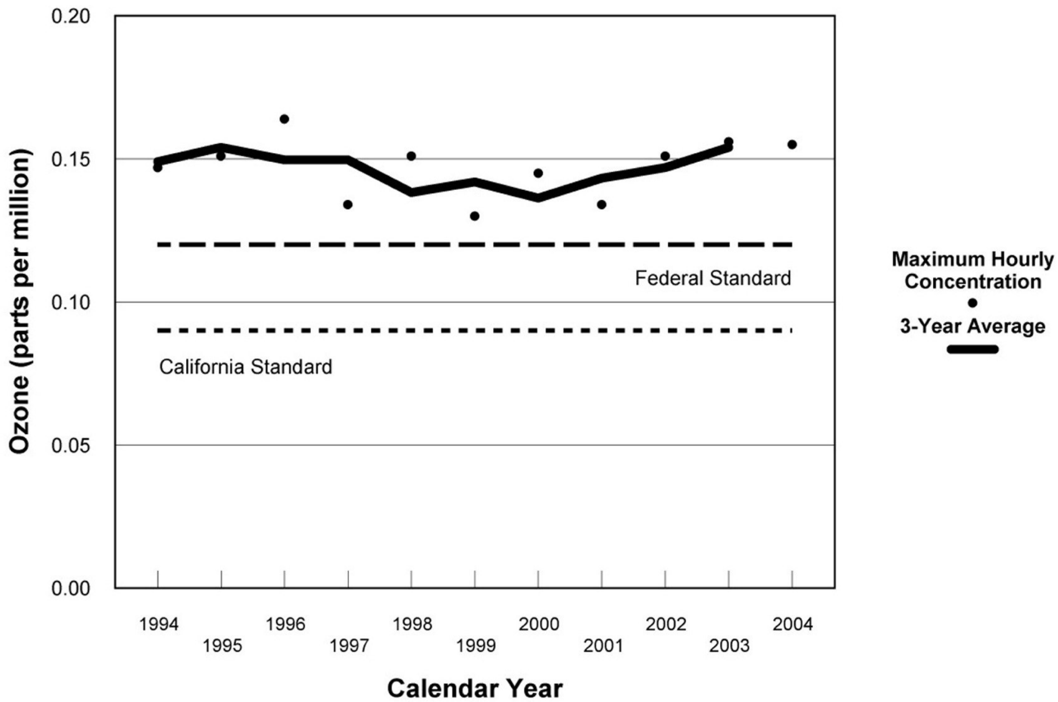



**FIGURE 5.2-7**
**MAXIMUM 8-HOUR OZONE LEVELS**
**ARVIN, 1994-2004**

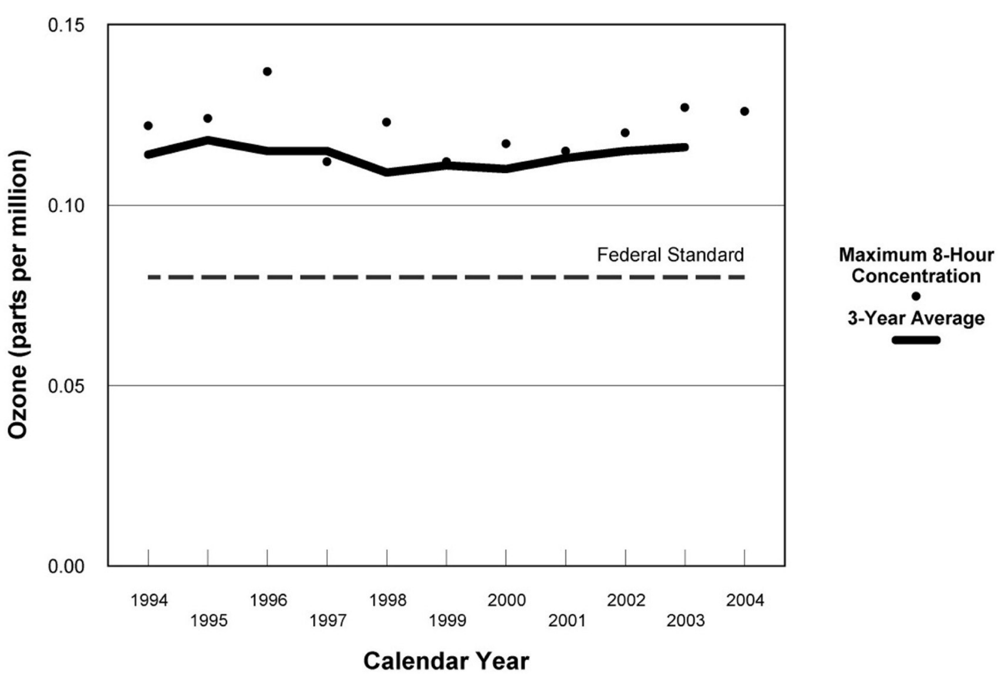


**FIGURE 5.2-8**
**MAXIMUM HOURLY $NO_2$ LEVELS**
**BAKERSFIELD, 1994-2004**

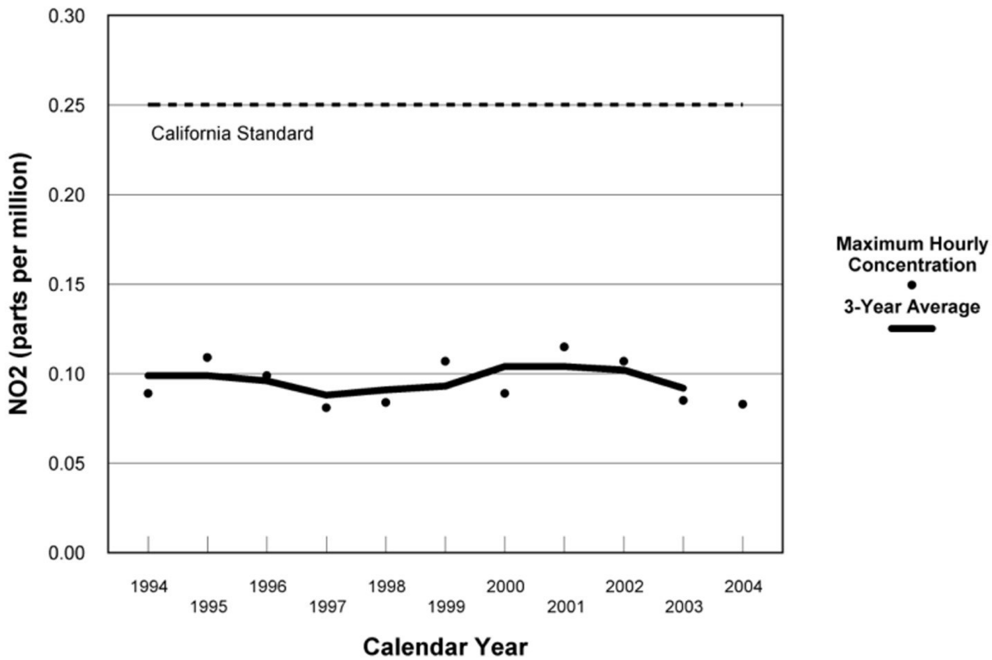



**FIGURE 5.2-9**
**MAXIMUM 1-HOUR AVERAGE CO LEVELS**
**BAKERSFIELD, 1994-2004**

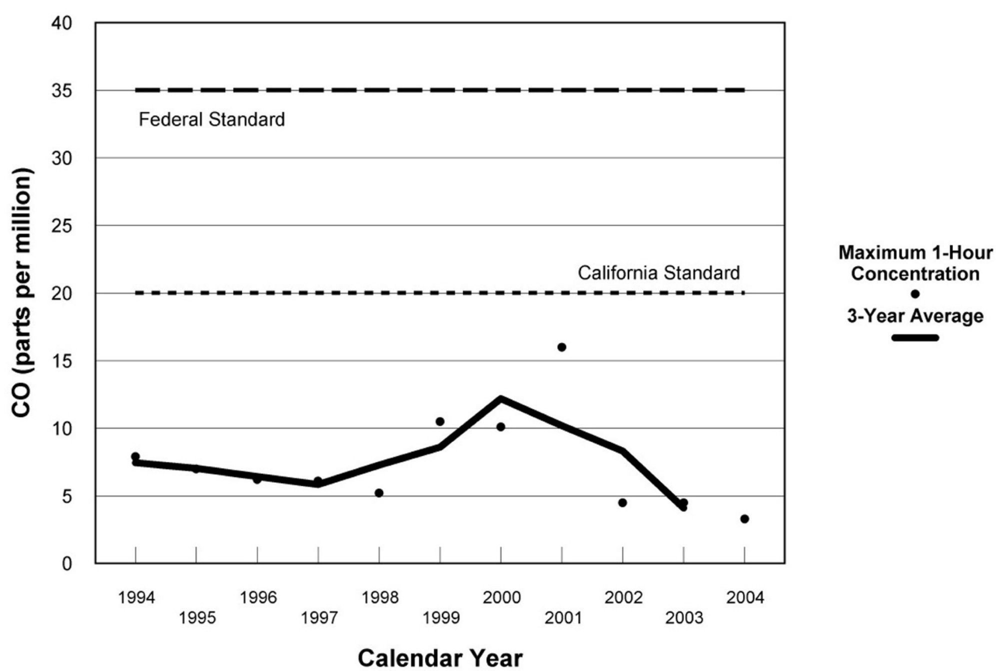


**FIGURE 5.2-10**
**MAXIMUM 8-HOUR AVERAGE CO LEVELS**
**BAKERSFIELD, 1994-2004**

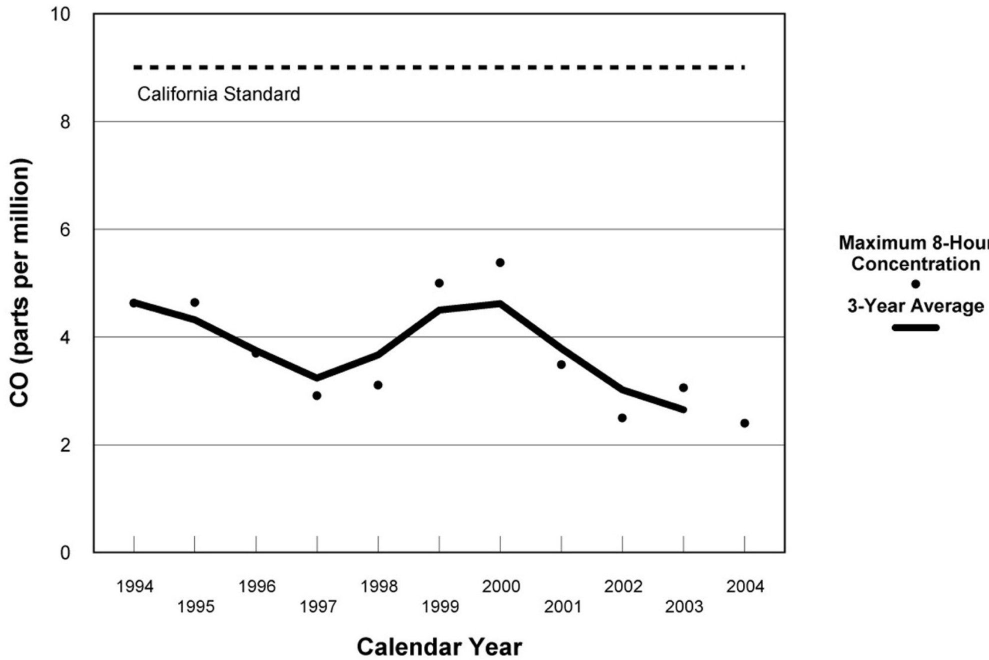


Table 5.2-5 presents the state air quality standard for $SO_2$ and the maximum levels recorded from 1994 through 2003 in Kern County[3]. The federal 24-hour average standard is 0.14 ppm; during the period shown, the average $SO_2$ levels measured at stations in the project area have been approximately less than one-tenth of the federal standard. Figure 5.2-11 shows that for several years the maximum 24-hour $SO_2$ levels typically have been less than approximately one-third of the state standard.

**TABLE 5.2-5**
**SULFUR DIOXIDE LEVELS IN KERN COUNTY, VARIOUS MONITORING STATIONS, 1994-2003 (PPM)**

| | 1994[a] | 1995[a] | 1996[a] | 1997[a] | 1998[b] | 1999[c] | 2000[a] | 2001 | 2002[b] | 2003[d] |
|---|---|---|---|---|---|---|---|---|---|---|
| Highest One-Hour Average | 0.020 | 0.026 | 0.059 | 0.011 | -- | n/a | n/a | 0.030 | -- | 0.009 |
| Highest 3-Hour Average | 0.013 | 0.018 | 0.029 | 0.005 | -- | n/a | n/a | 0.015 | -- | 0.006 |
| Highest 24-Hour Average | 0.006 | 0.015 | 0.010 | 0.004 | -- | 0.006 | 0.003 | 0.005 | -- | 0.004 |
| Annual Average | 0.003 | 0.003 | 0.002 | 0.002 | -- | 0.001 | 0.002 | 0.002 | -- | 0.002 |
| Number of days exceeding: | | | | | | | | | | |
| State Standard (0.04 ppm, 24-hr) | 0 | 0 | 0 | 0 | -- | 0 | 0 | 0 | -- | 0 |
| Federal Standard (0.14 ppm, 24-hr) | 0 | 0 | 0 | 0 | -- | 0 | 0 | 0 | -- | 0 |

Source: California Air Quality Data, California Air Resources Board website; USEPA AIRData website.
a. Bakersfield - 558 California Avenue
b. No data collected.
c. Bakersfield - 5558 California Avenue; only partial year available.
d. Fresno - Fremont School. Only $SO_2$ data available in SJV from Fresno; only partial year available.

### 5.2.3.5 Particulate Matter ($PM_{10}$)

Particulates in the air are caused by a combination of wind-blown fugitive dust; particles emitted from combustion sources and manufacturing processes; and organic, sulfate, and nitrate aerosols formed in the air from emitted hydrocarbons, sulfur oxides, and nitrogen oxides. In 1984, CARB adopted standards for $PM_{10}$ and phased out the total suspended particulate (TSP) standards that had been in effect previously. $PM_{10}$ standards were substituted for TSP standards because $PM_{10}$ corresponds to the size range of particulates that can be inhaled into the lungs and therefore is a better measure to use in assessing potential health effects. In 1987, USEPA also replaced national TSP standards with $PM_{10}$ standards. The SJVAPCD is classified as a severe nonattainment area for the federal $PM_{10}$ standard and is a nonattainment area for the state standard.

[3] 2003 data from Fresno.

Table 5.2-6 shows the federal and state air quality standards for $PM_{10}$, maximum levels recorded at the Bakersfield California Avenue monitoring station during 1995-2004, and geometric and arithmetic annual averages for the same period. The maximum 24-hour $PM_{10}$ levels exceed both state and federal standards. The annual average $PM_{10}$ levels have remained marginally below the federal standards throughout the period.

**TABLE 5.2-6**
**$PM_{10}$ LEVELS IN KERN COUNTY, BAKERSFIELD CALIFORNIA AVENUE MONITORING STATION, 1995-2004 (PPM)**

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|---|---|---|
| Highest 24-Hour Average | 130 | 153 | 137 | 155 | 145 | 147 | 204 | 134 | 116 | 95 |
| Annual Arithmetic Mean | | | | | | | | | | |
| (State Standard = 20 μg/m$^3$)[a] | 47.3 | 43.2 | 42.9 | 40.5 | 48.5 | 47.8 | 51.3 | 50.5 | 47.7 | 43 |
| (Federal Standard = 50 μg/m$^3$) | 46.3 | 43.2 | 42.3 | 38.7 | 47.6 | 45.9 | 47.7 | 49 | 47.7 | 44 |
| Number of Days Exceeding: | | | | | | | | | | |
| State Standard (50 μg/m$^3$, 24-hour) | 139.2 | 109.4 | 80.1 | 94.7 | 114.6 | 100.7 | 119.6 | 176.9 | 160.1 | -- |
| Federal Standard (150 μg/m$^3$, 24-hour) | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 0 | 0 | 0 |

Source: California Air Quality Data, California Air Resources Board website; USEPA AIRData website.
a. State annual standard was recently changed from 30 μg/m$^3$ to 20 μg/m$^3$.

The trend of maximum 24-hour average $PM_{10}$ levels is plotted in Figure 5.2-12, and the trend of expected violations of the state 24-hour standard of 50 μg/m$^3$ is plotted in Figure 5.2-13. Note that since $PM_{10}$ is measured only once every six days, expected violation days are six times the number of measured violations. The trend of maximum annual average $PM_{10}$ readings and the California and federal standards are shown in Figure 5.2-14. Annual average $PM_{10}$ concentrations are below the federal standard, but well above the new state standard of 20 μg/m$^3$.

### 5.2.3.6 Fine Particulate Matter ($PM_{2.5}$)

As discussed previously, the NAAQS for particulates were further revised by USEPA with new standards that went into effect on September 16, 1997; two new $PM_{2.5}$ standards were added at that time. In June 2002, CARB established a new annual standard for $PM_{2.5}$. $PM_{2.5}$ data have been collected at the Bakersfield California Avenue monitoring station since 1999, and are presented below.

Table 5.2-7 shows the state and federal air quality standards for $PM_{2.5}$, maximum levels recorded at the California Avenue monitoring station 1999-2004, and 3-year averages for the same period. The 24-hour average concentrations have exceeded the standard occasionally

FIGURE 5.2-11
24-HOUR AVERAGE $SO_2$ LEVELS
SAN JOAQUIN VALLEY, 1994-2004

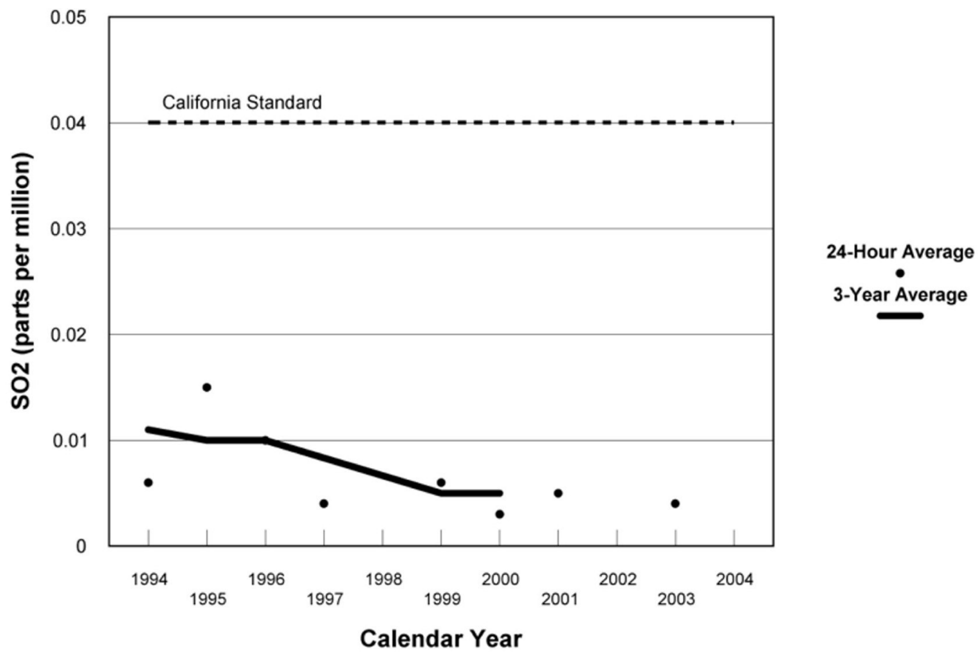



FIGURE 5.2-12
MAXIMUM 24-HOUR AVERAGE $PM_{10}$ LEVELS
BAKERSFIELD, 1994-2004

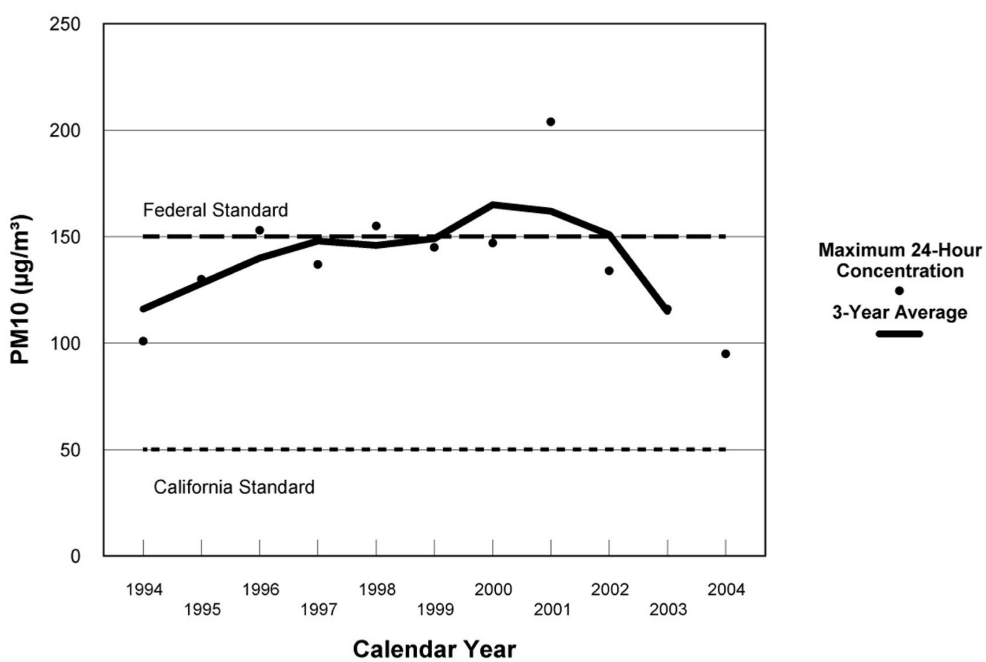


**FIGURE 5.2-13**
**EXPECTED VIOLATIONS OF THE CALIFORNIA**
**24-HOUR $PM_{10}$ STANDARD ($\mu g/m^3$)**
**BAKERSFIELD, 1994-2004**

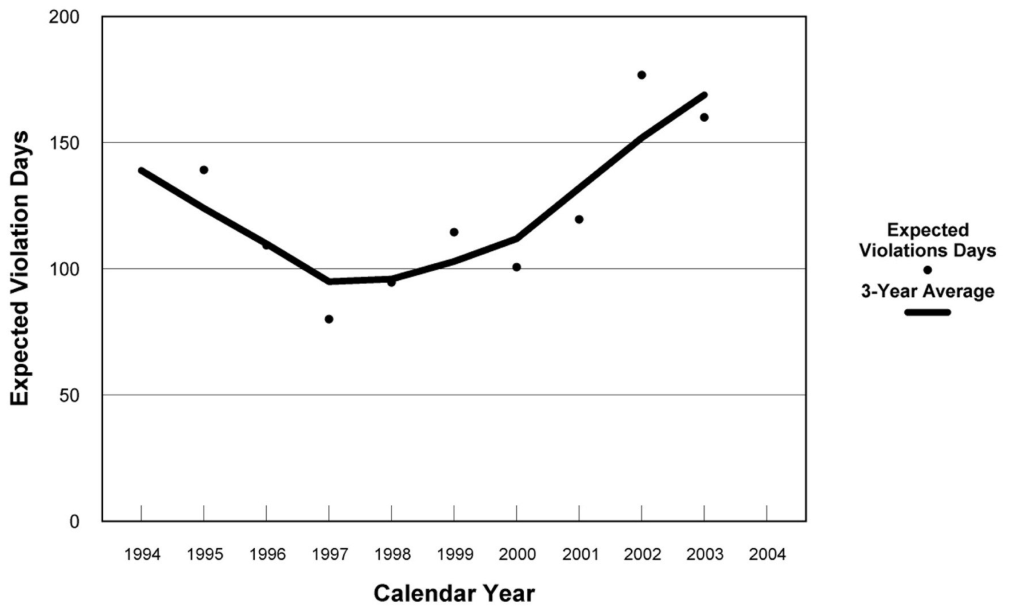



**FIGURE 5.2-14**
**ANNUAL AVERAGE $PM_{10}$ LEVELS**
**BAKERSFIELD, 1994-2004**

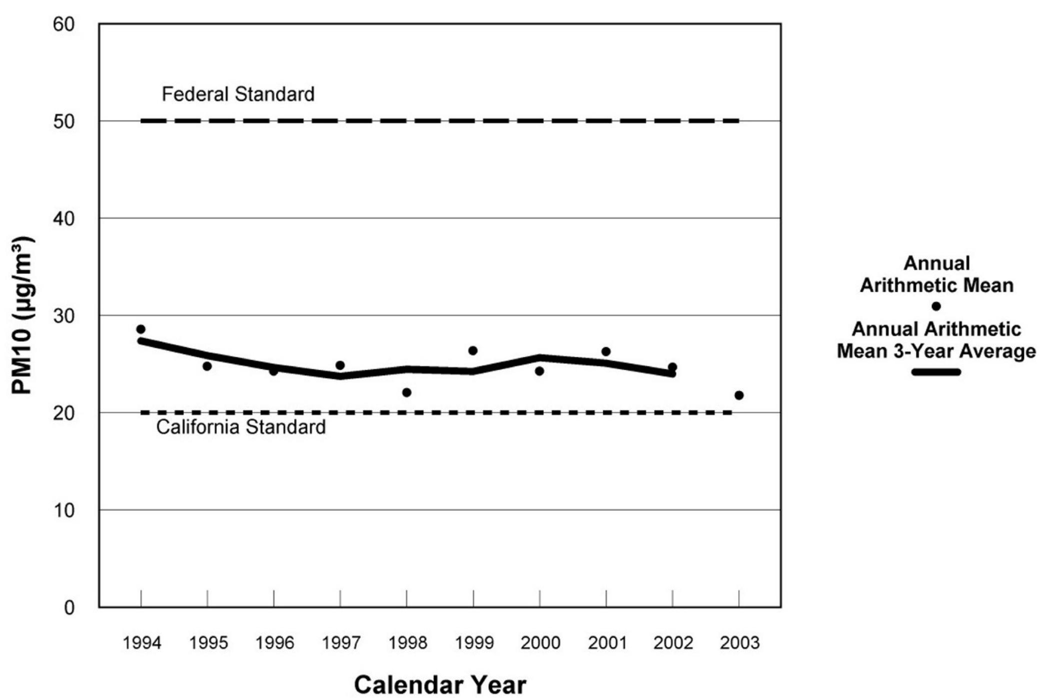


**TABLE 5.2-7**
**$PM_{2.5}$ LEVELS IN KERN COUNTY, BAKERSFIELD CALIFORNIA AVENUE MONITORING STATION, 1995-2004 (PPM)**

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|---|---|---|
| Highest 24-Hour Average | -- | -- | -- | -- | 134.8 | 112.7 | 154.7 | 89.6 | 59.3 | 63 |
| Number of Days Exceeding: | | | | | | | | | | |
| Federal Standard (65 μg/m³, 24-hour) | -- | -- | -- | -- | 28 | 19 | 19 | 14 | 0 | 0 |
| 98th Percentile | -- | -- | -- | -- | 111.3 | 95.4 | 94.9 | 73 | 59 | 62 |
| 3-yr Average, 98th Percentile | -- | -- | -- | -- | -- | -- | 95.0 | 86.0 | 75.6 | 64.7 |
| Annual Arithmetic Mean | -- | -- | -- | -- | 26.8 | 22 | 21.2 | 22.8 | 17.2 | 15.5 |
| 3-yr Annual Average (Federal Std = 15 μg/m³) | -- | -- | -- | -- | -- | -- | 23.3 | 22.0 | 20.4 | 18.5 |

Source: California Air Quality Data, California Air Resources Board website; USEPA AIRData website.

throughout the monitoring period; however, there are not enough data available to draw any conclusions regarding trends in the 3-year average of 98th percentile values. Annual average $PM_{2.5}$ levels have also occasionally exceeded the standard. The San Joaquin Valley Air Basin is considered a nonattainment area for the state $PM_{2.5}$ standard but is unclassified in relation to the federal standard.

The trend of 24-hour average $PM_{2.5}$ levels is plotted in Figure 5.2-15.

### 5.2.3.7 Airborne Lead

The majority of lead in the air results from the combustion of fuels that contain lead. Twenty-five years ago, motor gasolines contained relatively large amounts of lead compounds used as octane-rating improvers, and ambient lead levels were relatively high. Beginning with the 1975 model year, new automobiles began to be equipped with exhaust catalysts, which were poisoned by the exhaust products of leaded gasoline. Thus, unleaded gasoline became the required fuel for an increasing fraction of new vehicles, and the phaseout of leaded gasoline began. As a result, ambient lead levels decreased dramatically. The San Joaquin Valley Air Basin has been in attainment of state and federal airborne lead levels for air quality planning purposes for a number of years.

The ambient lead levels are also monitored in Bakersfield. Table 5.2-8 lists the federal air quality standard for airborne lead and the levels reported in Bakersfield between 1994 and 2004. Maximum quarterly levels are well below the federal standard.[4]

**TABLE 5.2-8**
**AIRBORNE LEAD LEVELS AT BAKERSFIELD, CALIFORNIA AVENUE MONITORING STATION, 1995-2004 (PPM)**

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|---|---|---|
| Highest Quarterly Average | 0.01 | 0.01 | 0.01 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | -- |
| Number of Days Exceeding Federal Standard (1.5 μg/m$^3$, quarterly) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -- |

Source: EPA AirData website

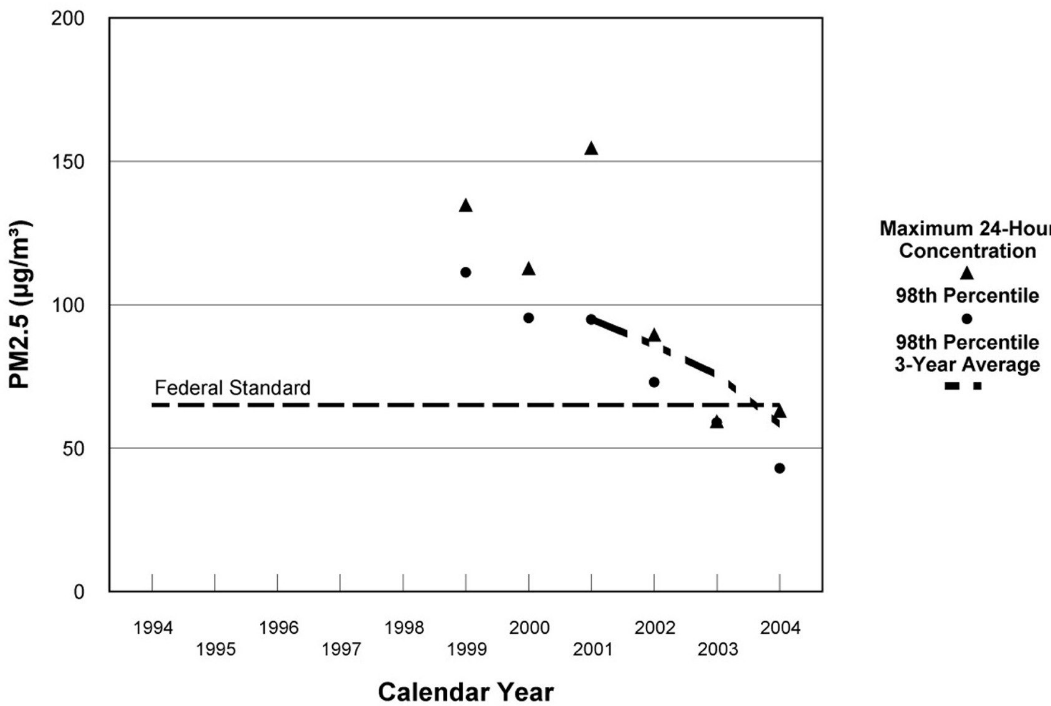
### 5.2.4 Affected Environment

The USEPA has responsibility for enforcing, on a national basis, the requirements of many of the country's environmental and hazardous waste laws. California is under the jurisdiction of USEPA Region IX, which has its offices in San Francisco. Region IX is responsible for the local administration of USEPA programs for California, Arizona, Nevada, Hawaii, and certain Pacific trust territories. USEPA's activities relative to the California air pollution control program focus principally on reviewing California's submittals for the State Implementation Plan (SIP). The SIP is required by the federal Clean Air Act to demonstrate how all areas of the state will meet the national ambient air quality standards within the federally specified deadlines (42 USC §7409, 7411).

The California Air Resources Board was created in 1968 by the Mulford-Carrell Air Resources Act, through the merger of two other state agencies. CARB's primary responsibilities are to develop, adopt, implement, and enforce the state's motor vehicle pollution control program; to administer and coordinate the state's air pollution research program; to adopt and update as necessary the state's ambient air quality standards; to review the operations of the local air pollution control districts; and to review and coordinate preparation of the SIP for achievement of the federal ambient air quality standards (California Health & Safety Code (H&SC) §39500 et seq.).

[4] ARB no longer reports summary lead statistics on its website.

**FIGURE 5.2-15**
**MAXIMUM & 98th PERCENTILE 24-HOUR $PM_{2.5}$ LEVELS**
**BAKERSFIELD, 1994-2004**



When the state's air pollution statutes were reorganized in the mid-1960s, local air pollution control districts (APCDs) were required to be established in each county of the state (H&SC §4000 et seq.). There are three different types of districts: county, regional, and unified. In addition, special air quality management districts (AQMDs), with more comprehensive authority over non-vehicular sources as well as transportation and other regional planning responsibilities, have been established by the Legislature for several regions in California, including the San Francisco Bay Area (H&SC §40200 et seq.).

Air pollution control districts and air quality management districts in California have principal responsibility for:

- Developing plans for meeting the state and federal ambient air quality standard
- Developing control measures for non-vehicular sources of air pollution necessary to achieve and maintain both state and federal air quality standards
- Implementing permit programs established for the construction, modification, and operation of sources of air pollution
- Enforcing air pollution statutes and regulations governing non-vehicular sources; and for developing employer-based trip reduction programs

Each level of government has adopted specific regulations that limit emissions from stationary combustion sources, several of which are applicable to this project. The other air agencies having permitting authority for this project are shown in Table 5.2-9. The applicable federal laws, ordinances, regulations and standards (LORS) and compliance with these requirements are discussed in more detail in the following sections. The SJVAPCD staff will treat the Application for Certification (AFC) as an application for a Determination of Compliance.

### 5.2.4.1 Laws, Ordinances, Regulations, and Standards

#### 5.2.4.1.1 Federal.

**Prevention of Significant Deterioration Program.** Authority: Clean Air Act §160-169A, 42 USC §7470-7491; 40 CFR Parts 51 and 52

Requirements: Requires prevention of significant deterioration (PSD) review and facility permitting for construction of new or modified major stationary sources of air pollution. PSD review applies with respect to attainment pollutants for which ambient concentrations are lower than the corresponding national ambient air quality standards (NAAQS). The following federal requirements apply on a pollutant-by-pollutant basis, depending on facility emission rates.

**TABLE 5.2-9**
**AIR QUALITY AGENCIES**

| Agency | Authority | Contact |
|---|---|---|
| USEPA Region IX | Oversight of permit issuance, enforcement | Gerardo Rios, Chief Permits Office<br>USEPA Region IX<br>75 Hawthorne Street<br>San Francisco, CA 94105<br>(415) 744-1259 |
| California Air Resources Board | Regulatory oversight | Mike Tollstrup, Chief<br>Project Assessment Branch<br>California Air Resources Board<br>2020 L Street<br>Sacramento, CA 95814<br>(916) 322-6026 |
| San Joaquin Valley Air Pollution Control District | Permit issuance, enforcement | Thomas Goff<br>Permit Services Manager<br>2700 M Street, Suite 275<br>Bakersfield, CA 93301-2373<br>(661) 326-6900 |

- Emissions must be controlled using Best Available Control Technology (BACT).
- Air quality impacts, in combination with the impacts of other increment-consuming sources, must not exceed maximum allowable incremental increases for $SO_2$, $PM_{10}$, and $NO_x$.
- Air quality impacts of all sources in the area plus ambient pollutant background levels cannot exceed NAAQS.
- Pre- and/or post-construction air quality monitoring may be required.
- The air quality impacts on soils, vegetation, and nearby PSD Class I areas (specific national parks and wilderness areas) must be evaluated. (Note: The PEF project is located in a Class II area.)

EPA has retained the authority to issue PSD permits for projects in the San Joaquin Valley APCD. Since the proposed project will be subject to PSD review, the applicant will to seek a separate permit from EPA.

Administering Agency: USEPA Region IX.

**New Source Review.** Authority: Clean Air Act §171-193, 42 USC §7501 et seq.; 40 CFR Parts 51 and 52

Requirement: Requires new source review (NSR) facility permitting for construction or modification of specified stationary sources. New source review applies with respect to nonattainment pollutants for which ambient concentration levels are higher than the corresponding NAAQS. The following federal requirements apply on a pollutant-by-pollutant basis, depending on facility emission rates.

- Emissions must be controlled to the lowest achievable emission rate (LAER).
- Sufficient offsetting emissions reductions must be obtained following the requirements in the regulations to continue reasonable further progress toward attainment of applicable NAAQS.
- The owner or operator of the new facility has demonstrated that major stationary sources owned or operated by the same entity in California are in compliance or on schedule for compliance with applicable emissions limitations in this rule.
- The administrator must find that the implementation plan has been adequately implemented.
- An analysis of alternatives must show that the benefits of the proposed source significantly outweigh any environmental and social costs.

New source review jurisdiction has been delegated to the SJVAPCD for all nonattainment pollutants and is discussed further under local LORS and conformance below.

Administering Agency: SJVAPCD, with USEPA Region IX oversight.

**Acid Rain Program.** Authority: Clean Air Act §401 (Title IV), 42 USC §7651

Requirement: Requires the reduction of the adverse effects of acid deposition through reductions in emissions of sulfur dioxide and nitrogen oxides. SJVAPCD has received delegation authority to implement Title IV.

Administering Agency: SJVAPCD, with USEPA Region IX oversight.

**Title V Operating Permits Program.** Authority: Clean Air Act §501 (Title V), 42 USC §7661

Requirements: Establishes comprehensive operating permit program for major stationary sources. SJVAPCD has received delegation authority for this program.

Administering Agency: SJVAPCD, with USEPA Region IX oversight.

**National Standards of Performance for New Stationary Sources.** Authority: Clean Air Act §111, 42 USC §7411; 40 CFR Part 60

Requirements: Establishes national standards of performance for new stationary sources. These standards are enforced at the local level with USEPA oversight. Relevant new stationary source performance standards are discussed under local LORS below.

Administering Agency: SJVAPCD, with USEPA Region IX oversight.

**National Emission Standards for Hazardous Air Pollutants.** Authority: Clean Air Act §112, 42 USC §7412

Requirements: Establishes national emission standards for hazardous air pollutants. These standards are enforced at the local level with USEPA oversight and are further discussed under local LORS and conformance below.

Administering Agency: SJVAPCD, with USEPA Region IX oversight.

#### 5.2.4.1.2 State.

**Nuisance Regulation.** Authority: CA Health & Safety Code §41700

Requirements: Provides that "no person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause injury or damage to business or property."

Administering Agency: SJVAPCD and CARB

**Toxic "Hot Spots" Act.** Authority: H& SC §44300-44384; 17 CCR §93300-93347

Requirements: Requires preparation and biennial updating of inventory of facility emissions of hazardous substances listed by CARB, in accordance with CARB's regulatory guidelines. Risk assessments are to be prepared by facilities required to submit emissions inventories according to local priorities.

Administering Agency: SJVAPCD and CARB

**CEC and CARB Memorandum of Understanding.** Authority: CA Pub. Res. Code §25523(a); 20 CCR §1752, 1752.5, 2300-2309 and Div. 2, Chap. 5, Art. 1, Appendix B, Part (k)

Requirements: Provides for the inclusion of requirements in the CEC's decision on an application for certification to assure protection of environmental quality; application is required to include information concerning air quality protection.

Administering Agency: California Energy Commission

**5.2.4.1.3 Local.**

**District Regulations and Policies.** Authority: CA Health & Safety Code §40001

Requirements: Prohibit emissions and other discharges (such as smoke and odors) from specific sources of air pollution in excess of specified levels.

Administering Agency: SJVAPCD, with CARB oversight.

**5.2.4.2 Conformance of Facility**

As addressed in this section, PEF is designed, and will be constructed and operated, in accordance with all relevant federal, state, and local requirements and policies concerning protection of air quality.

**5.2.4.2.1 California Clean Air Act.** AB 2595, the California Clean Air Act (Act), was enacted by the California Legislature and became law in January 1989. The Act requires the local air pollution control districts to attain and maintain both the federal and state ambient air quality standards at the "earliest practicable date." The Act contains several milestones for local districts and the California Air Resources Board. In 2002, the SJVAPCD prepared an air quality plan defining the program for meeting the required emission reduction milestones in the San Joaquin Valley.

Air quality plans must demonstrate attainment of the state ambient air quality standards and must result in a five percent annual reduction in emissions of nonattainment pollutants (ozone, CO, $NO_x$, $SO_2$, and their precursors) in a given district (H&SC §40914). A local district may adopt additional stationary source control measures or transportation control measures, revise existing source-specific or new source review rules, or expand its vehicle inspection and maintenance program (H&SC §40918) as part of the plan. District air quality plans specify the development and adoption of more stringent regulations to achieve the requirements of the Act. The applicable regulations that will apply to the proposed project are included in the discussion of District prohibitory rules in Section 5.2.4.2.8.

**5.2.4.2.2 Authority to Construct.** Rule 2010 (Permits Required) specifies that any facility installing nonexempt equipment that causes or controls the emission of air pollutants must first obtain an Authority to Construct from the SJVAPCD. Under Section 5.2.9 of Rule 2201 (New and Modified Stationary Source Review Rule), the District's Final Determination of

Compliance acts as an authority to construct for a power plant upon approval of the project by the CEC.

**5.2.4.2.3 Review of New or Modified Sources.** Rule 2201 (New and Modified Stationary Source Review Rule) implements the federal NSR program, as well as the new source review requirements of the California Clean Air Act. The rule contains the following elements:

- Best available control technology (BACT)
- Emission offsets
- Air quality impact analysis (AQIA)

**Best Available Control Technology.** Best Available Control Technology (BACT) must be applied to any new or modified source resulting in an emissions increase exceeding any SJVAPCD BACT threshold shown in Table 5.2-10.

**TABLE 5.2-10**
**SJVAPCD BACT EMISSION THRESHOLDS**

| Pollutant | Threshold |
|---|---|
| PM | 2 lb/day |
| $NO_x$ | 2 lb/day |
| VOC | 2 lb/day |
| $SO_2$ | 2 lb/day |
| CO | 100 tpy |

The SJVAPCD defines BACT as the most stringent emission limitation or control technique that:

- Has been achieved in practice for such emissions unit and class of source; or
- Is contained in any State Implementation Plan approved by the USEPA for such emissions unit category and class of source. A specific limitation or control technique shall not apply if the owner or operator of the proposed emissions unit demonstrates to the satisfaction of the APCO that such limitation or control technique is not presently achievable; or
- Is any other emission limitation or control technique, including process and equipment changes of basic and control equipment, found by the APCO to be technologically feasible for such class or category of sources or for a specific source, and cost-effective as determined by the APCO.

**Emission Offsets.** A new or modified facility with a stationary source NSR balance exceeding the SJVAPCD offset thresholds shown in Table 5.2-11 must offset all emissions increases at a ratio that varies according to the distance between the facility and the source of the offsets.

**TABLE 5.2-11**
**SJVAPCD OFFSET EMISSION THRESHOLDS**

| Pollutant | Threshold, lb/yr |
|---|---|
| $NO_x$ | 20,000 |
| $SO_2$ | 54,730 |
| CO[a] | 200,000 |
| VOC | 20,000 |
| PM | 29,200 |

a. In attainment areas. CO emissions in nonattainment areas subject to 30,000 lb/yr offset threshold.

**Air Quality Impact Analysis.** An air quality impact analysis must be conducted to evaluate impacts of emission increases from new or modified facilities on ambient air quality. Project emissions must not cause an exceedance of any ambient air quality standard.

**Toxic Risk Management.** The District's Risk Management Review Policy for Permitting New and Modified Sources provides a mechanism for evaluating potential impacts of air emissions of toxic substances from new, modified, and relocated sources in the SJVAPCD. The rule requires a demonstration that the source will not adversely impact the health and welfare of the public.

**CEC Review.** Rule 2201, Section 5.2 establishes a procedure for coordinating SJVAPCD review of power plant projects with the CEC AFC process. Under this rule, the SJVAPCD reviews the AFC and issues a Determination of Compliance for a proposed project, which is equivalent to an Authority to Construct. A permit to operate is issued following the CEC's certification of a project and demonstration of compliance with all permit conditions.

**5.2.4.2.4 Prevention of Significant Deterioration.** The PSD requirements apply, on a pollutant-specific basis, to any project that is a new major stationary source or a major modification to an existing major stationary source. A major source is a listed facility (one of 28 PSD source categories listed in the federal Clean Air Act) that emits at least 100 tpy, or any facility that emits at least 250 tpy.

The PSD program contains the following elements:

- Air quality monitoring
- BACT
- Air quality impact analysis
- Protection of Class I areas
- Visibility, soils, and vegetation impacts

The project will result in emissions exceeding the applicable PSD thresholds, and, therefore, PSD does apply to this project. As the SJVAPCD does not have delegation for the PSD program, a separate PSD application must be filed with the USEPA.

**Air Quality Monitoring.** At its discretion, USEPA may require pre-construction and/or post-construction ambient air quality monitoring for PSD sources. Pre-construction monitoring data must be gathered over a one-year period to characterize local ambient air quality. Post-construction air quality monitoring data must be collected as deemed necessary by USEPA to characterize the impacts of project emissions on ambient air quality.

**Best Available Control Technology.** BACT must be applied to any modified major source to minimize the emissions of those pollutants exceeding the PSD emission thresholds. USEPA defines BACT as an emissions limitation based on the maximum degree of reduction for each subject pollutant, considering energy, environmental, and economic impacts, that is achievable through the application of available methods, systems, and techniques. BACT must be as stringent as any emission limit required by an applicable NSPS or NESHAP.

**Air Quality Impact Analysis.** An air quality dispersion analysis must be conducted to evaluate impacts of significant emission increases from new or modified facilities on ambient air quality. PSD source emissions must not cause an exceedance of any ambient air quality standards, and the increase in ambient air concentrations must not exceed the allowable increments shown in Table 5.2-12.

**TABLE 5.2-12**
**PSD CLASS II INCREMENTS[a]**

| Pollutant | Averaging Period | Allowable Increment ($\mu g/m^3$) |
|---|---|---|
| $NO_x$ | Annual | 25 |
| $SO_2$ | Annual | 20 |
| | 24-Hour | 91 |
| | 3-Hour | 512 |

a. The SJVAPCD has been designated nonattainment for $PM_{10}$. Therefore, PSD requirements are not applicable for $PM_{10}$.

**<u>Protection of Class I Areas</u>.** The increase in ambient air quality concentrations for the relevant pollutants (i.e., $NO_x$ or $SO_2$) within Class I locations must be characterized if there is a significant emission increase associated with the new or modified PSD source.

**<u>Visibility, Soils, and Vegetation Impacts</u>.** Impairment to visibility, soils, and vegetation resulting from PSD source emissions as well as associated commercial, residential, industrial, and other growth must be analyzed. Cumulative impacts to local ambient air quality must also be analyzed.

**5.2.4.2.5 <u>Acid Rain Permit</u>.** Rule 2540 (Acid Rain Program) requires that certain subject facilities comply with maximum operating emissions levels for $SO_2$ and $NO_x$, and must monitor $SO_2$, $NO_x$, and $CO_2$ emissions and exhaust gas flow rates. A Phase II acid rain facility, such as PEF, must obtain an acid rain permit as mandated by Title IV of the 1990 Clean Air Act Amendments. A permit application must be submitted to the SJVAPCD at least 24 months before operation of the new unit commences. The application must present all relevant Phase II sources at the facility, a compliance plan for each unit, applicable standards, and an estimated commencement date of operations.

**5.2.4.2.6 <u>Federal Operating Permit</u>.** Rule 2520 (Federally Mandated Operating Permits) requires major facilities and Phase II acid rain facilities undergoing modifications to obtain an operating permit containing the federally enforceable requirements mandated by Title V of the 1990 Clean Air Act Amendments. A permit amendment application for a modification to an existing Title V facility must be submitted and an amended permit issued by the SJVAPCD prior to commencing operations at the facility. The application must present a process description, all new stationary sources at the facility, applicable regulations, estimated emissions, associated operating conditions, alternative operating scenarios, a facility compliance plan, and a compliance certification.

**5.2.4.2.7 <u>New Source Performance Standards</u>.** Rule 4001 (New Source Performance Standards) requires compliance with applicable federal standards of performance for new or modified stationary sources.

Subpart GG (Standards of Performance for Stationary Gas Turbines) applies to gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules per hour (Gj/hr) (10.15 MMBtu/hr) at higher heating value. The proposed new turbines have an hourly heat input that exceeds this threshold. The NSPS $NO_x$ emission limit is defined by the following equation:

$$STD = \frac{0.0075\ (14.4)}{Y} + F$$

where:

STD = allowable $NO_x$ emissions (percent volume at 15 percent $O_2$ on a dry basis)

Y = manufacturer's rated heat rate at peak load (kilojoules per watt hour)

F = $NO_x$ emission allowance for fuel-bound nitrogen (assumed to be zero for natural gas)

The value of Y for the GE Frame 7FA CTG to be used for this project is 9,936 kJ/kWh, so the Subpart GG standard for this CTG is 109 ppmvd @ 15% $O_2$.

EPA recently issued a Notice of Proposed Rulemaking for a new Subpart KKKK that would apply to gas turbines with a heat input in excess of 1 MMBtu/hr that commence construction after February 18, 2005. Gas turbines subject to this rule would be exempt from Subpart GG. If the rule is ultimately adopted, it would be applicable to the proposed PEF Expansion turbine and Subpart GG would not apply.

Subpart KKKK limits $NO_x$ and $SO_2$ emissions from the new gas turbine based on power output. The limits for turbines greater than 30 MW are 0.39 lb $NO_x$ per MW-hr and 0.58 lb $SO_2$ per MW-hr. The proposed emissions limits of 2.5 ppmc $NO_x$ and 0.4 ppmc $SO_2$ are well below the proposed Subpart KKKK limits, as shown in Table 5.2-13.

**TABLE 5.2-13**
**COMPLIANCE WITH 40 CFR 60 SUBPART KKKK**

| Pollutant | Proposed Permit Limit | | | Subpart KKKK Limit, |
|---|---|---|---|---|
| | ppmc | lb/hr | lb/MW-hr | lb/MW-hr |
| $NO_x$ | 2.5 | 16.25 | 0.10 | 0.39 |
| $SO_2$ | 0.4 | 3.64 | 0.023 | 0.59 |

Compliance with the NSPS limits must be demonstrated through an initial performance test. Since the PEF Expansion turbine will be equipped with a continuous $NO_x$ emissions monitor, annual performance testing will not be required under the NSPS.

**5.2.4.2.8 SJVAPCD Prohibitory Rules.** The general prohibitory rules of the SJVAPCD applicable to the project include the following:

- Rule 4101 – Visible Emissions: Prohibits visible emissions as dark or darker than Ringelmann No. 2 for periods greater than three minutes in any hour.
- Rule 4102 – Nuisance: Prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or that damage business or property.

- Rule 4201 – Particulate Matter Emission Standards: Prohibits PM emissions in excess of 0.1 grains per dry standard cubic foot (gr/dscf).
- Rule 4703 – Stationary Gas Turbines: Limits $NO_x$ and CO emissions from stationary gas turbines to 9 ppm (@15 percent $O_2$, corrected for efficiency) and 25 ppm, respectively.
- Rule 4801 – Sulfur Compounds: Prohibits sulfur compound emissions, calculated as $SO_2$, in excess of 0.2 percent (2,000 ppm) from any source.
- Rule 8010 – Fugitive Dust Administrative Requirements for Control of $PM_{10}$: Sets forth definitions, applicability and administrative requirements for anthropogenic sources of $PM_{10}$.
- Rule 8020 – Fugitive Dust Requirements for Control of $PM_{10}$ from Construction, Demolition, Excavation and Extraction Activities: Limits fugitive dust emissions from construction, demolition, excavation and related activities.

All applicable LORS are summarized in Table 5.2-14.

## 5.2.5 Environmental Impacts

### 5.2.5.1 Overview of the Analytical Approach to Estimating Facility Impacts

The new unit to be constructed at PEF is one simple-cycle GE 7FA combustion turbine. The turbine will be equipped with dry low-$NO_x$ combustors and a selective catalytic reduction (SCR) system for $NO_x$ control. Emissions control systems will be fully operational during all operations except startups and shutdowns. Maximum annual emissions are based on operation of the CTG at maximum firing rates for up to 8760 engine hours per year, including startups and shutdowns.

Ambient air quality impact analyses for the facility have been conducted to satisfy the District, EPA, and CEC requirements for impacts from criteria pollutants ($NO_2$, CO, $PM_{10}$, and $SO_2$) and noncriteria pollutants during project construction and operation. The following sections describe the emission sources that have been evaluated, the results of the ambient impact analyses, and the evaluation of facility compliance with the applicable air quality regulations, including the District's NSR requirements.

**5.2.5.1.1 New Equipment.** The proposed new simple cycle combustion turbine is a General Electric 7FA combustion turbine driving a nominal 160 MW turbine generator. The combustion turbine will be fueled exclusively with natural gas. The combustion turbine will be equipped with a dry low-$NO_x$ combustor to control $NO_x$ emissions and will use a small portion of the cooling capacity of the existing cooling towers. Post-combustion air pollution controls will include SCR for $NO_x$

## TABLE 5.2-14
## LAWS, ORDINANCES, REGULATIONS, STANDARDS (LORS), AND PERMITS FOR PROTECTION OF AIR QUALITY

| LORS | Purpose | Regulating Agency | Permit or Approval | Schedule and Status of Permit | Conformance (Sections) |
|---|---|---|---|---|---|
| | | **Federal** | | | |
| Clean Air Act (CAA) §160-169A and implementing regulations, Title 42 United States Code (USC) §7470-7491 (42 USC §7470-7491), Title 40 Code of Federal Regulations (CFR) Parts 51 & 52 (Prevention of Significant Deterioration Program) | Requires prevention of significant deterioration (PSD) review and facility permitting for construction of new or modified major stationary sources of air pollution. PSD review applies to pollutants for which ambient concentrations are lower than NAAQS. | USEPA | Issues Prevention of Significant Deterioration Permit for a Major Modification to an Existing Major Source. | Permit to be obtained before start of construction. | 5.2.2.4, 5.2.4.3 |
| CAA §171-193, 42 USC §7501 et seq. (New Source Review) | Requires new source review (NSR) facility permitting for construction or modification of specified stationary sources. NSR applies to pollutants for which ambient concentration levels are higher than NAAQS. | SJVAPCD with USEPA oversight | After project review, issues DOC with conditions limiting emissions. | Agency approval to be obtained before start of construction. | 5.2.2.4, 5.2.4.3 |
| CAA §401 (Title IV), 42 USC §7651 (Acid Rain Program) | Requires reductions in $NO_x$ and $SO_2$ emissions. | SJVAPCD with USEPA oversight | Issues Acid Rain monitoring plan error report after review of application. | Meet compliance deadlines listed in regulations; no permit issued. | 5.2.2.4, 5.2.4.3 |
| CAA §501 (Title V), 42 USC §7661 (Federal Operating Permits Program) | Establishes comprehensive permit program for major stationary sources. | SJVAPCD with USEPA oversight | Issues Title V permit after review of application. | Permit to be obtained prior to commence- ment of construction. | 5.2.2.4, 5.2.4.3 |
| CAA §111, 42 USC §7411, 40 CFR Part 60 (New Source Performance Standards – NSPS) | Establishes national standards of performance for new stationary sources. | SJVAPCD with USEPA oversight | After project review, issues DOC with conditions limiting emissions. | Agency approval to be obtained before start of construction. | 5.2.2.4, 5.2.4.3 |

**TABLE 5.2-14 (CONTINUED)**
**LAWS, ORDINANCES, REGULATIONS, STANDARDS (LORS), AND PERMITS FOR PROTECTION OF AIR QUALITY**

| LORS | Purpose | Regulating Agency | Permit or Approval | Schedule and Status of Permit | Conformance (Sections) |
|---|---|---|---|---|---|
| | | **State** | | | |
| H&SC §44300-44384; California Code of Regulations (CCR) §93300-93347 (Toxic "Hot Spots" Act) | Requires preparation and biennial updating of facility emission inventory of hazardous substances; risk assessments. | SJVAPCD with CARB oversight | After project review, issues DOC with conditions limiting emissions. | Screening HRA submitted as part of AFC. | 5.2.2.4 |
| California Public Resources Code §25523(a); 20 CCR §§1752, 2300-2309 (CEC & CARB Memorandum of Understanding) | Requires that CEC's decision on AFC include requirements to assure protection of environmental quality; AFC required to address air quality protection. | CEC | After project review, issues Final Certification with conditions limiting emissions. | SJVAPCD approval of AFC, i.e., DOC, to be obtained prior to CEC approval. | 5.2.2.4 |
| | | **Local** | | | |
| SJVUPCD Rule 2201 (New and Modified Stationary Source Review) | NSR: Requires that pre-construction review be conducted for all proposed new or modified sources of air pollution, including BACT, emissions offsets, and air quality impact analysis. | SJVAPCD with CARB oversight | After project review, issues DOC with conditions limiting emissions. | Agency approval to be obtained before start of construction. | 5.2.2.4, 5.2.4.3 |
| SJVAPCD Rule 2520 (Federally Mandated Operating Permits) | Implements operating permits requirements of CAA Title V. | SJVAPCD with USEPA oversight | Issues Title V permit after review of application. | Agency approval to be obtained before start of construction. | 5.2.2.4, 5.2.4.3 |
| SJVAPCD Rule 2540 (Acid Rain Program) | Implements acid rain regulations of CAA Title IV. | SJVAPCD with USEPA oversight | Issues Title IV permit after review of application. | Application to be made within 12 months of start of facility operation. | 5.2.2.4, 5.2.4.3 |
| SJVAPCD Rule 4101 (Visible Emissions) | Limits visible emissions to no darker than Ringelmann No. 2 for periods greater than 3 minutes in any hour. | SJVAPCD with CARB oversight | After project review, issues DOC with conditions limiting emissions. | Agency approval to be obtained prior to commencement of operation. | 5.2.2.4, 5.2.4.3 |

## TABLE 5.2-14 (CONTINUED)
## LAWS, ORDINANCES, REGULATIONS, STANDARDS (LORS), AND PERMITS FOR PROTECTION OF AIR QUALITY

| LORS | Purpose | Regulating Agency | Permit or Approval | Schedule and Status of Permit | Conformance (Sections) |
|---|---|---|---|---|---|
| SJVAPCD Rule 4102 (Public Nuisance) | Prohibits emissions in quantities that adversely affect public health, other businesses, or property. | SJVAPCD with CARB oversight | After project review, issues DOC with conditions limiting emissions. | Agency approval to be obtained before start of construction. | 5.2.2.4, 5.2.4.3 |
| SJVAPCD Rule 4201 (Particulate Matter) | Limits PM emissions from stationary sources. | SJVAPCD with CARB oversight | After project review, issues DOC with conditions limiting emissions. | Agency approval to be obtained before start of construction. | 5.2.2.4, 5.2.4.3 |
| SJVAPCD Rule 4801 (Sulfur Compounds Emissions) | Limits $SO_2$ emissions from stationary sources. | SJVAPCD with CARB oversight | After project review, issues DOC with conditions limiting emissions. | Agency approval to be obtained before start of construction. | 5.2.2.4, 5.2.4.3 |
| SJVAPCD Rule 4703 (Stationary Gas Turbines) | Limits $NO_x$ and CO emissions from gas turbines. | SJVAPCD with CARB oversight | After project review, issues DOC with conditions limiting emissions. | Agency approval to be obtained before start of construction. | 5.2.2.4, 5.2.4.3 |
| SJVAPCD Rule 4001 (New Source Performance Standards: 40 CFR 60, Subpart GG, Stationary Gas Turbines; Subpart Da, Boilers; proposed Subpart KKKK, Gas Turbines) | Requires monitoring of fuel, other operating parameters; limits $NO_x$ and $SO_2$ and PM emissions, requires source testing, emissions monitoring, and recordkeeping. | SJVAPCD with CARB oversight | After project review, issues DOC with conditions limiting emissions. | Agency approval to be obtained before start of construction. | 5.2.2.4, 5.2.4.3 |

control. The combustion turbine may be operated up to 24 hours per day, 7 days per week. Specifications for the new combustion turbine are summarized in Table 5.2-15. A typical fuel analysis is summarized in Table 5.2-16.

**TABLE 5.2-15**
**NEW GE 7FA SIMPLE CYCLE COMBUSTION TURBINE DESIGN SPECIFICATIONS**

| | |
|---|---|
| Manufacturer | General Electric |
| Model | 7FA |
| Fuel | Natural gas |
| Design Ambient Temperature[a] | 35°F |
| Nominal Heat Input Rate | 1,791 MMBtu/hr @ HHV |
| Nominal Power Generation Rate | 160 MW |
| Nominal Exhaust Temperature | 800°F (with dilution air) |
| Nominal Exhaust Flow Rate | 3,000,000 acfm |
| Nominal Exhaust $O_2$ Concentration, dry volume | 14% |
| Exhaust $CO_2$ Concentration, dry volume | 4% |
| Exhaust Moisture Content, wet volume | 8% |
| Emission Controls | Dry Low-$NO_x$ Combustor and SCR (2.5 ppmv $NO_x$ @ 15% $O_2$) |

a. Low-temperature scenario corresponds to maximum heat input rate.

**TABLE 5.2-16**
**NOMINAL FUEL PROPERTIES – NATURAL GAS**

| Component Analysis | | Chemical Analysis | |
|---|---|---|---|
| **Component** | **Average Concentration, Volume** | **Constituent** | **Percent by Weight** |
| $CH_4$ | 91.66 % | C | 73.35 % |
| $C_2H_6$ | 5.38 % | H | 23.64 % |
| $C_3H_8$ | 0.87 % | N | 2.48 % |
| $C_4H_{10}$ | 0.18 % | O | 0.53 % |
| $C_5H_{12}$ | 0.04 % | S | <1 gr/100 scf |
| $C_6H_{14}$ | 0.02 % | Higher Heating Value | 1056 Btu/scf<br>22,899 Btu/lb |
| $N_2$ | 1.54 % | | |
| $CO_2$ | 0.29 % | | |
| S | <0.00% | | |

Emissions and operating parameters for the turbine under various loads and ambient conditions are shown in the Air Quality Technical Report, Appendix A, Table A-1.

Because the new CTG is a simple cycle unit, its water requirements are minimal. Inlet fogging will be used to cool and humidify inlet air under warm-temperature conditions to allow increased heat input to and higher power output from the CTG. The existing four-cell cooling tower has adequate capacity to provide cooling water needed for the PEF Expansion CTG without requiring an increase in maximum water circulation rate above the 74,000 gpm rate that was the basis for the existing cooling tower permit. Therefore there will be no increase in cooling tower emissions as a result of the proposed PEF Expansion project.

#### 5.2.5.1.2 Facility Operations.

**New GE 7FA Simple Cycle Combustion Turbine.** Combustion turbine performance specifications were developed for three temperature scenarios – high temperature (102°F), average temperature (66°F), and low temperature (35°F). The low-temperature scenario was used to characterize maximum emissions because it has the highest hourly heat input and emission rates. Maximum daily operations are based on full-load operation of the CTG for 24 hours. Maximum annual emissions are based on full-time, full-load operation including 300 hours per year of startup activity. Heat input limits, as summarized in Table 5.2-17, were established to provide the basis for the calculation of project and facility emissions.

**TABLE 5.2-17**
**EXPANSION CTG OPERATIONS**

| Interval | Heat Input, MMBtu ( HHV) |
|---|---|
| Hourly | 1791 |
| Daily | 42,984 |
| Annual | 15,689,160 |

### 5.2.5.2 Emissions Assessment

The proposed project is a modification to an existing major source. This section of the application presents calculated emissions from the new equipment as well as emissions from the existing permitted equipment for the purpose of demonstrating rule compliance.

This section also presents calculated TAC emissions from the proposed new combustion turbine. Tables containing the detailed calculations for both criteria and noncriteria emissions are included in the Air Quality Technical Report, Appendix A.

**5.2.5.2.1 Criteria Pollutant Emissions: Expansion CTG.** Proposed maximum emissions from the expansion CTG were estimated on an hourly, daily, and annual basis based on expected operation and proposed annual operating limitations.

**Emissions during Normal Operations.** Emissions of $NO_x$, CO, and VOC were calculated from emission limits (in ppmv @ 15% $O_2$) and the exhaust flow rates. The $NO_x$ emission limit reflects the application of SCR. The VOC and CO emission limits reflect the use of good combustion practices.

Maximum emissions are based on the highest heat input rate, shown in Table 5.2-17.

$SO_x$ emissions were calculated from the heat input (in MMBtu) and a $SO_x$ emission factor (in lb/MMBtu). The $SO_x$ emission factor of 0.0020 lb/MMBtu was derived from the maximum allowable fuel sulfur content of 0.75 grains per 100 standard cubic feet. $SO_x$ emissions were calculated using the heat input rates in Table 5.2-17 and the same hourly limit that applies to the existing CTGs.

Maximum hourly $PM_{10}$ emissions are based on results of recent source tests of similar turbines. $PM_{2.5}$ emissions were determined based on the assumption that all gas turbine exhaust particulate matter emissions are less than 2.5 microns in size.

Emissions for the expansion CTG are summarized in Table 5.2-18. The BACT analysis upon which the emission factors are based is presented in the Air Quality Technical Report, Appendix E, and summarized in Section 5.2.6.3.

**TABLE 5.2-18**
**MAXIMUM EMISSION RATES – EXPANSION CTG**

| Pollutant | ppmv @ 15% $O_2$ | lb/MMBtu | lb/hr |
|---|---|---|---|
| $NO_x$ | 2.5[a] | 0.009 | 16.25 |
| $SO_2$[b] | 0.40 | 0.0020 | 3.495 |
| CO | 6.0[a] | 0.0133 | 23.75 |
| VOC | 2.0[a] | 0.0025 | 4.53 |
| $PM_{10}$ | n/a | n/a | 9.0 |

a. $NO_x$, CO, and VOC emission rates exclude startups and shutdowns (see Table 5.2-18).
b. Based on annual average natural gas sulfur content of 0.75 gr/100 scf and the hourly $SO_2$ permit limit for the existing PEF CTGs.

**Emissions During Startup and Shutdown.** Maximum emission rates expected to occur during a startup or shutdown are shown in Table 5.2-19. $PM_{10}$ and $SO_2$ emissions are not included in this table because emissions of these pollutants will not be higher during startup and shutdown than during normal turbine operation.

**TABLE 5.2-19**
**EXPANSION CTG STARTUP AND SHUTDOWN EMISSION RATES**

| | $NO_x$ | CO | VOC |
|---|---|---|---|
| Startup and Shutdown, lb/hr | 80 | 902 | 16 |

**Criteria Pollutant Emissions Summary: Expansion CTG.** The calculation of maximum facility emissions shown in Table 5.2-20 is based on the CTG emission rates shown in Tables 5.2-18 and 5.2-19, the fuel use limitations in Table 5.2-17, and the following assumptions:

- The expansion CTG may operate up to 24 hours per day
- The CTG may have up to two 1-hour startups per day, with a total of 2 hours of startup/shutdown activity
- The CTG may have a total of 300 hours per year of startup/shutdown activity

**TABLE 5.2-20**
**EMISSIONS FROM EXPANSION CTG**

| | Pollutant | | | | |
|---|---|---|---|---|---|
| Emissions/Equipment | $NO_x$ | $SO_2$ | CO | VOC | $PM_{10}$ |
| Maximum Hourly Emissions | | | | | |
| CTG[a], pounds per hour | 80 | 3.5 | 902 | 16 | 9.0 |
| Maximum Daily Emissions | | | | | |
| CTG, pounds per day | 450 | 84 | 2,113 | 132 | 216 |
| Maximum Annual Emissions | | | | | |
| CTG, pounds per year | 164,250 | 30,616 | 471,492 | 43,154 | 78,840 |

a. Maximum hourly $NO_x$, CO, and VOC emission rates reflect emissions during startup.

As discussed above, there will be no increase in emissions from the cooling tower (S-3636-5-2) as a result of the operation of the PEF Expansion.

**5.2.5.2.2 Criteria Pollutant Emissions: Existing Equipment.** The pre-project Stationary Source Potential to Emit (SSPE1) is equal to the overall potential to emit limit for all units covered by existing Authorities to Construct at the facility. The SSPE1 for the existing facility is shown in Table 5.2-21.

**TABLE 5.2-21**
**POTENTIAL TO EMIT FOR EXISTING FACILITY**

| Emissions/Equipment | Maximum Annual Emissions, lb/yr | | | | |
|---|---|---|---|---|---|
| | $NO_x$ | $SO_2$ | CO | VOC | $PM_{10}$ |
| CTGs | 344,484 | 84,780 | 1,220,166 | 227,619 | 224,343 |
| Cooling Towers | 0 | 0 | 0 | 0 | 12,118 |
| Diesel Fire Pump Engine[a] | 889 | 22 | 46 | 17.5 | 11 |
| Emergency Generator | 368 | 0 | 724 | 46 | 0 |
| Total | 345,741 | 84,802 | 1,220,936 | 227,683 | 236,472 |

### 5.2.5.3 Emissions Assessment: Toxic Air Contaminants

**5.2.5.3.1 Toxic Air Contaminant Emissions: Expansion CTG.** Maximum hourly and annual TAC emissions were estimated for the proposed expansion CTG. Maximum proposed TAC emissions were calculated from the heat input rate (in MMBtu/hr and MMBtu/yr), emission factors (in lb/mmcf), and the nominal higher heating value of 1056 Btu/scf. Hourly and annual emissions were based on the heat input rates shown in Table 5.2-17. The ammonia emission factor was derived from an ammonia slip limit of 10 ppmv @ 15% $O_2$.

Other emission factors were obtained from AP-42 (Table 3.1-3, 4/00, and Table 3.4-1 of the Background Document for Section 3.1) and from the California Air Resources Board's CATEF database for combustion turbines. TAC emissions are summarized in Table 5.2-22.

### 5.2.5.4 Air Quality Impact Analysis

SJVAPCD Rule 2201, Section 4.14.2 requires the applicant to provide ambient air quality modeling analyses and other impact assessments.

**5.2.5.4.1 Air Quality Modeling Methodology.** An assessment of impacts from the PEF Expansion turbine on ambient air quality has been conducted using USEPA-approved air quality dispersion models. These models are based on various mathematical descriptions of atmospheric diffusion and dispersion processes in which a pollutant source impact can be calculated over a given area.

The impact analysis was used to determine the worst-case ground-level impacts of the new turbines. The results were compared with established state and federal ambient air quality standards and PSD significance levels. If the standards are not exceeded then it is assumed that, in the operation of the facility, no exceedances are expected under any conditions. In accordance with the air quality impact analysis guidelines developed by USEPA (40 CFR Part 51, Appendix W: Guideline on Air Quality Models) and CARB (Reference Document

**TABLE 5.2-22**
**MAXIMUM PROPOSED TAC EMISSIONS: EXPANSION CTG**

| Compound | Emission Factor (lb/mmcf)[a] | Maximum Proposed Emissions lb/hr | Maximum Proposed Emissions tpy |
|---|---|---|---|
| Ammonia[b] | 10 ppm | 24.1 | 101.2 |
| Propylene | 0.771 | 1.3 | 5.7 |
| **Hazardous Air Pollutants** | | | |
| Acetaldehyde | 0.0408 | $6.9 \times 10^{-2}$ | 0.3 |
| Acrolein | 0.0065 | $1.1 \times 10^{-2}$ | $4.9 \times 10^{-2}$ |
| Benzene | 0.0123 | $2.1 \times 10^{-2}$ | $9.1 \times 10^{-2}$ |
| 1,3-Butadiene | 0.000439 | $7.4 \times 10^{-4}$ | $3.3 \times 10^{-3}$ |
| Ethylbenzene | 0.0326 | $5.5 \times 10^{-2}$ | 0.24 |
| Formaldehyde | 0.0635 | 0.11 | 0.47 |
| Hexane | 0.259 | 0.44 | 1.9 |
| Naphthalene | 0.00133 | $2.25 \times 10^{-3}$ | $9.9 \times 10^{-3}$ |
| PAHs[c] | 0.00017 | $3.0 \times 10^{-4}$ | $1.3 \times 10^{-3}$ |
| Propylene Oxide | 0.0296 | $4.6 \times 10^{-2}$ | 0.20 |
| Toluene | 0.133 | 0.23 | 0.99 |
| Xylene | 0.0653 | 0.11 | 0.48 |
| **Total HAPs** | | | **4.8** |

a. Obtained from AP-42 and the CATEF database for natural gas-fired combustion turbines. See text.
b. Based on an exhaust $NH_3$ limit of 10 ppmv @ 15% $O_2$.
c. Carcinogenic PAHs only; naphthalene considered separately.

for California Statewide Modeling Guideline, April 1989), the ground-level impact analysis includes the following assessments:

- Impacts in simple, intermediate, and complex terrain
- Aerodynamic effects (downwash) due to nearby building(s) and structures
- Impacts from inversion breakup (fumigation)

Simple, intermediate, and complex terrain impacts were assessed for all meteorological conditions that would limit the amount of final plume rise. Plume impaction on elevated terrain, such as on the slope of a nearby hill, can cause high ground-level concentrations, especially under stable atmospheric conditions. Another dispersion condition that can cause high ground-level pollutant concentrations is caused by building downwash. Building downwash can occur when wind speeds are high and a building or structure is in close proximity to the emission stack. This can result in building wake effects where the plume is drawn down toward the ground by the lower pressure region that exists in the lee side (downwind) of the building or structure.

Fumigation conditions occur when the plume is emitted into a low-lying layer of stable air (inversion) that then becomes unstable, resulting in a rapid mixing of pollutants towards the ground. The low mixing height that results from this condition allows little diffusion of the stack plume before it is carried downwind to the ground. Although fumigation conditions rarely last as long as an hour, relatively high ground-level concentrations may be reached during that period. Fumigation tends to occur under clear skies and light winds, and is more prevalent in the summer.

The basic model equation used in this analysis assumes that the concentrations of emissions within a plume can be characterized by a Gaussian distribution about the centerline of the plume. Concentrations at any location downwind of a point source such as a stack can be determined from the following equation:

$$C(x, y, z, H) = \left(\frac{Q}{2\pi\sigma_y\sigma_z u}\right) * \left(e^{-1/2\left(y/\sigma_y\right)^2}\right) * \left[\left\{e^{-1/2\left(z-H/\sigma_z\right)^2}\right\} + \left\{e^{-1/2\left(z+H/\sigma_z\right)^2}\right\}\right]$$

where

| | | |
|---|---|---|
| C | = | the concentration in the air of the substance or pollutant in question |
| Q | = | the pollutant emission rate |
| $\sigma_y \sigma_z$ | = | the horizontal and vertical dispersion coefficients, respectively, at downwind distance x |
| u | = | the wind speed at the height of the plume center |
| x,y,z | = | the variables that define the 3-dimensional Cartesian coordinate system used; the downwind, crosswind, and vertical distances from the base of the stack |
| H | = | the height of the plume above the stack base (the sum of the height of the stack and the vertical distance that the plume rises due to the momentum and/or buoyancy of the plume) |

Gaussian dispersion models are approved by USEPA for regulatory use and are based on conservative assumptions (i.e., the models tend to over predict actual impacts by assuming steady-state conditions, no pollutant loss through conservation of mass, no chemical reactions, etc.). The USEPA models were used to determine if ambient air quality standards would be exceeded, and whether a more accurate and sophisticated modeling procedure would be warranted to make the impact determination. The following sections describe:

- Screening modeling procedures
- Refined air quality impact analysis
- Existing ambient pollutant concentrations and preconstruction monitoring
- Results of the ambient air quality modeling analyses
- PSD increment consumption

In general, modeling for this project was performed in accordance with the modeling protocol submitted to the District and the CEC in the PEF Modeling Protocol that was prepared for the original licensing proceeding in 1999. The modeling procedures used for each type of modeling analysis are described in more detail in the following sections.

Three different EPA guideline models were used in the ambient air quality impact analysis.

Industrial Source Complex, Short-Term Model ISCST3 (Version 02035) was used in a screening mode to evaluate impacts in simple terrain. ISCST3 is a Gaussian dispersion model capable of assessing impacts from a variety of source types in areas of simple, intermediate, and complex terrain. The model can account for settling and dry deposition of particulates; area, line, and volume source types; downwash effects; and gradual plume rise as a function of downwind distance. The model is capable of estimating concentrations for a wide range of averaging times (from one hour to one year). ISCST was used with worst-case (screening) meteorology for this project.

The CTSCREEN model was used to evaluate impacts in elevated terrain. CTSCREEN uses an array of predetermined meteorological conditions to model the user supplied source-terrain configuration. CTSCREEN yields estimates of 1-hour concentrations and uses persistence factors to estimate 3-hour, 24-hour, and annual impacts. In comparison with other complex terrain screening models, CTSCREEN provides estimates that most consistently reflect CTDMPLUS (EPA 1990).

The SCREEN3 model was used to evaluate turbine impacts under fumigation conditions. The fumigation analysis is discussed in more detail below.

**Turbine Screening Modeling.** The screening and refined air quality impact analyses were performed using the ISC and CTSCREEN models. Inputs required by the models include the following:

- Model options
- Meteorological data
- Source data

- Receptor data

Model options refer to user selections that account for conditions specific to the area being modeled or to the emissions source that needs to be examined. Examples of model options include use of site-specific vertical profiles of wind speed and temperature; consideration of stack and building wake effects; and time-dependent exponential decay of pollutants. The model supplies recommended default options for the user. Except where explicitly stated, such as for building downwash, as described in more detail below, default values were used. A number of these default values are required for USEPA and local District approval of model results and are listed below.

- Rural dispersion coefficients
- Gradual plume rise
- Stack tip downwash
- Buoyancy induced dispersion
- Calm processing
- Default urban wind profile exponents
- Default vertical temperature gradients = 0.02, 0.035
- 10 meter anemometer height

ISCST3 uses hourly meteorological data to characterize plume dispersion. The representativeness of the data is dependent on the proximity of the meteorological monitoring site to the area under consideration, the complexity of the terrain, the exposure of the meteorological monitoring site, and the period of time during which the data are collected. Because the maximum project impacts occur in complex terrain south of the facility and no current, nearby meteorological data are available, screening meteorological data were used to conservatively assess worst-case impacts from the project.

The required emission source data inputs to all three models used in this analysis include source locations, source elevations, stack heights, stack diameters, stack exit temperatures and velocities, and emission rates. The source locations are specified for a Cartesian (x,y) coordinate system where x and y are distances east and north in meters, respectively. The Cartesian coordinate system used is the Universal Transverse Mercator Projection (UTM). The stack height that can be used in the model is limited by federal Good Engineering Practice (GEP) stack height restrictions, discussed in more detail below. In addition, ISCST3 requires nearby building dimension data to calculate the impacts of building downwash.

For the purposes of modeling, a stack height beyond what is required by Good Engineering Practices is not allowed. However, this requirement does not place a limit on the actual constructed height of a stack. GEP as used in modeling analyses is the height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, or wakes that may be created by the source itself, nearby structures, or nearby terrain obstacles. In addition, the GEP modeling restriction assures that any required regulatory control measure is not compromised by the effect of that portion of the stack that exceeds the GEP. The USEPA guidance ("Guideline for Determination of Good Engineering Practice Stack Height," Revised 6/85) for determining GEP stack height indicates that GEP is the greater of 65 meters or $H_g$, where $H_g$ is calculated as follows:

$$H_g = H + 1.5L$$

where:

$H_g$ = Good Engineering Practice stack height, measured from the ground-level elevation at the base of the stack

H = height of nearby structure(s) measured from the ground-level elevation at the base of the stack

L = lesser dimension, height or maximum projected width, of nearby structure(s)

In using this equation, the guidance document indicates that both the height and width of the structure are determined from the frontal area of the structure, projected onto a plane perpendicular to the direction of the wind.

For the new turbine stack, the nearby (influencing) structure is the existing HRSG 4 structure, which is 78 feet (23.77 m) high and 67 feet (20.39 m) long. Thus H = L = 67 feet, and $H_g$ = 2.5 * 67 = 167 ft. This is less than 65 meters, so the proposed stack height of 131 feet does not exceed GEP stack height.

For regulatory applications, a building is considered sufficiently close to a stack to cause wake effects when the downwind distance between the stack and the nearest part of the building is less than or equal to five times the lesser of the height or the projected width of the building. Building dimensions for the buildings analyzed as downwash structures were obtained from plot plans. The building dimensions were analyzed using the Building Profile Input Program (BPIP) to calculate 36 wind-direction-specific building heights and projected building widths for use in building wake calculations. The building dimensions used in the GEP analysis are shown in the Air Quality Technical Report, Appendix B, Table B-1 and Figure B-1.

**Screening Procedures and Unit Impact Modeling.** Screening modeling was performed to select the worst-case turbine operating mode for each pollutant and averaging period. The modeling used emissions data based on an average Bakersfield temperature (66°F) and typical maximum and minimum temperatures (102°F and 35°F) at minimum and maximum turbine operating load points of 60 and 100 percent. The determination of the worst-case turbine operating condition depends on how changes in emissions rates and stack characteristics (plume rise characteristics) interact with terrain features. For example, lower mass emissions resulting from lower load operations may cause higher concentrations than other operating conditions because lower final plume height may have a greater significant interaction with terrain features.

Initial ISCST3 modeling runs were performed using normalized emission rates to assess the zone of impact and relative magnitude of the impacts. Assumed meteorological conditions under all stability classes and for wind speeds ranging from 1 to 20 m/s were considered for wind directions in 10-degree increments. Based on these conservative conditions, it was identified that the primary impact area occurs to the South of the project in the elevated terrain of the Tehachapi Mountains.

The areas identified by the ISCST3 analysis as having the highest modeled impacts were further analyzed in a subsequent CTSCREEN modeling analysis. The screening modeling was also performed using assumed hourly meteorological data. For both the ISC and CTSCREEN turbine screening modeling, the turbine was modeled with a unit emission rate of 1 g/s to obtain maximum 1-hour, 8-hour and annual average Chi/Q values. These Chi/Q values were multiplied by the emission rate (g/s) from the turbine to calculate concentrations of CO and $NO_2$.

Three hills have been identified for the CTSCREEN analysis. The hills are identified as Southwest Hill A, Southwest Hill B, and Southeast Hill. The modeling results from the preliminary modeling analysis indicate that the highest pollutant concentrations would occur on the Southeast Hill A. Screening modeling to determine the worst-case expansion turbine impacts for each pollutant and averaging period were performed for all hills, but analyses of full project impacts were limited to Southeast Hill A fine grids only. Coarse grid receptors were placed along contours that differ in elevation by 100 meters, but fine 50 x 50 meter Cartesian grid receptors were also used. Elevations were obtained from digital elevation maps based on US Geologic Survey topographical maps. The topography of the hills and the layout of the receptor grids are shown in the Air Quality Technical Report, Appendix B, Figure B-3.

The results of the screening analysis are shown in the Air Quality Technical Report, Appendix B, Table B-3. The stack parameters and emission rates corresponding to the operating case that produced the maximum impacts in the turbine screening analysis for each pollutant and averaging period were used in the refined modeling analysis to evaluate the combined impacts of the new turbine and the existing facility. For the unit impacts analysis, the CEC staff's recommendation regarding receptor grid spacing has been followed.[5]

**Refined Air Quality Impact Analysis.** CTSCREEN was used in all surrounding areas of complex terrain (elevations higher than final plume height) located to the south of the project site. Based on consultation with the USEPA for the original facility (June 1999), CTSREEN was also used to assess impacts for intermediate terrain (elevations above stack height, but below final plume height).

In simple terrain (elevations below stack height), which is predominately north of the project, the EPA approved ISCST3 model was used with worst-case (screening) meteorological data. The ISCST3 model was used to calculate 1-hour average concentrations. Persistence factors of 0.9, 0.7, 0.4, and 0.1 were used to estimate 3-hour, 8-hour, 24-hour, and annual average concentrations, respectively.

Refined modeling was performed in two phases: coarse grid modeling and fine grid modeling. Preliminary modeling was performed with the coarse grid to locate the areas of maximum concentration. Fine grids were used to refine the location of the maximum concentrations.

The stack parameters and emission rates used to model combined impacts from the new turbine and the existing facility are shown in the Air Quality Technical Report, Appendix B, Table B-4. The model receptor grids were derived from 30-meter DEM data. The CEC guidance cited above was used to locate receptors. Twenty-five-meter refined receptor grids were used in areas where the coarse grid analyses indicated modeled maxima for each site plan would be located. A map showing the layout of each receptor grid around the site plan is presented in the Air Quality Technical Report, Figures B-2 and B-3, Appendix B.

Terrain features were taken from USGS DEM data and 7.5-minute quadrangle maps of the area including Mettler, Tejon Hills, Tejon Ranch, Grapevine, Pastoria Creek, Winters Ridge, Frazier Mountain, Lebec and La Liebre Ranch. Simple terrain was represented by a mixed 250-meter resolution coarse grid and a semi-coarse near-facility grid at 100-meter resolution. The number of mixed receptors is 2,302. In addition, adjacent to the fenceline, one tier of 92 receptors was established, at 25-meter resolution, for a total of 2,394 simple terrain receptors. The refined, simple terrain fine grids contain 247 receptors at 50-meter resolution. The coarse complex and intermediate terrain receptor grids contain 13,344 receptors at an irregular resolution corresponding to 100-meter elevation contours over a large area. The fine complex and intermediate terrain receptor grids contain 5,797 receptors at 50-meter resolution.

[5] 25-meter resolution along the facility fenceline to 100 meters from the fenceline, 100 meter resolution from 100 meters to 1,000 meters from the fenceline, and 250-meter spacing out to as far as 10 km from the site.

**Specialized Modeling Analyses.**

**Fumigation Modeling.** Fumigation occurs when a stable layer of air lies a short distance above the release point of a plume and unstable air lies below. Under these conditions, an exhaust plume may be drawn to the ground, causing high ground-level pollutant concentrations. Although fumigation conditions rarely last as long as one hour, relatively high ground-level concentrations may be reached during that time. For this analysis, fumigation was assumed to occur for up to 90 minutes, per EPA guidance.

The SCREEN3 model was used to evaluate maximum ground-level concentrations for short-term averaging periods (24 hours or less). Although this modeling analysis is not required by District regulation, guidance from the USEPA[6] was followed in evaluating fumigation impacts. The maximum fumigation impact from the turbines occurred approximately 40 km from the facility. This analysis, which is shown in more detail in the Air Quality Technical Report, Appendix B, Table B-5, showed that impacts under fumigation conditions are expected to be lower than the maximum concentrations calculated by CTSCREEN in complex terrain.

**Turbine Startup**. Facility impacts were also evaluated during the startup of the new turbine simultaneously with one of the existing combined cycle turbines to evaluate short-term impacts under worst-case startup emissions. Emission rates used for this scenario were based on permitted $NO_x$ and CO emission rates during startup. Turbine exhaust parameters for minimum load operation were used to characterize turbine exhaust during startup and the CO and $NO_x$ emission rates from Table 5.2-19 were used.

**Ozone Limiting**. In accordance with the procedure followed for similar projects, one-hour $NO_2$ impacts during construction were modeled using ISC3_OLM (Industrial Source Complex, Version 3, Ozone Limiting Method) Model (version 96113). While this version of ISCST3 is not based on the latest model ISCST3 update, this modeling analysis does not include any features that were affected by recent model updates.

ISC3_OLM uses hourly ozone data to perform ozone-limiting calculations on individual plumes on an hour-by-hour basis. In accordance with the procedures followed for similar projects, the most complete available year of meteorological data and 1996 ozone data collected at the nearest monitoring station to PEF, in Bakersfield, were used for this analysis. Annual $NO_x$ impacts during construction were modeled using ISCST3. Annual $NO_x$ impacts were converted to $NO_2$ using the EPA-guidance Ambient Ratio Method and the nationwide default conversion rate of 0.75.

[6] USEPA, October 1992.

**<u>Turbine Commissioning</u>.** There are several high emissions scenarios possible during commissioning. The first is the period prior to SCR system installation, when the combustor is being tuned. Under this scenario, $NO_x$ emissions would be high because the $NO_x$ emissions control system would not be functioning and because the combustor would not be tuned for optimum performance. CO emissions would also be high because combustor performance would not be optimized. The second high emissions scenario may occur when the combustor has been tuned but the SCR installation is not complete, and other parts of the turbine operating system are being checked out. Since the combustor would be tuned but the control system installation would not be complete, $NO_x$ and CO levels could again be high. Commissioning activities and expected emissions are discussed in more detail below.

**5.2.5.3.2 <u>Results of the Ambient Air Quality Modeling Analyses</u>.** The maximum impacts from the new turbine, calculated from the refined, startup and fumigation modeling analyses described above are summarized in Table 5.2-23 below.

**TABLE 5.2-23**
**AIR QUALITY MODELING RESULTS FOR THE EXPANSION CTG**

| Pollutant | Averaging Time | Modeled Concentration (µg/m$^3$) | | |
|---|---|---|---|---|
| | | ISCST3/ CTSCREEN | Startup | Fumigation |
| $NO_2$ | 1-hour | 5.9 | 34.7 | 0.6 |
| | Annual | 0.3 | a | c |
| $SO_2$ | 1-hour | 1.3 | b | 0.1 |
| | 3-hour | 0.9 | b | 0.1 |
| | 24-hour | 0.2 | b | 0.04 |
| | Annual | 0.06 | b | c |
| CO | 1-hour | 8.6 | 391.0 | 0.9 |
| | 8-hour | 4.3 | 51.4 | 0.5 |
| $PM_{2.5}/PM_{10}$ | 24-hour | 0.9 | b | 0.1 |
| | Annual | 0.2 | b | c |

a. Not applicable, because startup emissions are included in the modeling for annual average.
b. Not applicable, because emissions are not elevated above normal levels during startup.
c. Not applicable, because inversion breakup is a short-term phenomenon and as such is evaluated only for short-term averaging periods.

**5.2.5.3.3 <u>Impacts During Turbine Commissioning</u>.** As discussed above, $NO_2$ and CO impacts could be higher during commissioning than under other operating conditions already evaluated. The commissioning period for the project is comprised of several equipment tests. These tests and the associated $NO_x$ and CO emissions are briefly summarized below. The emissions calculations are shown in more detail in the Air Quality Technical Report, Appendix B, Table B-7.

- Full Speed No Load Tests (FSNL) – The tests include a test of the combustion turbine ignition system, a test to ensure that the CTG is synchronized with its electric generator, and a test of the CTG's overspeed system. During the tests, the heat input to the CTG will be approximately 360 MMBtu/hr or 20% of the maximum heat input rating. Worst-case $NO_x$ emission concentrations are expected to be 100 ppm at 15% oxygen, or 130 lb/hr at 360 MMbtu/hr. Total operating time for these tests is expected to be about 4 hours. CO and VOC emissions during these tests are assumed to be equivalent to emission rates during startup.
- Minimum Load Tests – These tests will occur over several days. During this testing period the CTG combustor will be tuned to minimize emissions and other checks will be performed. This test period will allow for complete combustion path warm-up, required for removing all debris that could potentially damage the SCR catalyst. During the tests, the heat input to the combustion turbine will be approximately 360 MMBtu/hr or 20% of the maximum heat input rating, with an average $NO_x$ emission concentration for the period assumed be 25 ppm at 15% $O_2$. The worst case CO emission rate is assumed to be equivalent to 17 times the controlled emission rate.
- Full Speed, No Load Tests (SCR Not Operational) – These tests will occur over approximately a 4-day period. The SCR catalyst will be installed during this testing period, but no ammonia will be injected. During the tests, the heat input to the CTG will be approximately 360 MMBtu/hr or 20% of the maximum heat input rating, with an average $NO_x$ emission concentration of about 30 ppm at 15% $O_2$. Again, the worst case CO emission rate is assumed to be equivalent to 17 times the controlled emissions.
- Multiple Load Tests (SCR Fully Operational) – These tests will occur over approximately a 13-day period. By the beginning of this test period the control systems will be completely tuned and achieving $NO_x$ and CO control at design levels. During the tests, the heat input to each combustion turbine will be approximately 1791 MMBtu/hr or 100% of the maximum heat input rating.

Total heat rate will vary between about 10,000 Btu/kWh and 14,000 Btu/kWh (HHV) during commissioning activities. Average heat rate for the entire commissioning period is expected to be about 10,000 Btu/kWh to 12,000 Btu/kWh (HHV).

The maximum modeled $NO_2$ and CO impact during commissioning will occur under the turbine operating conditions that are least favorable for dispersion. As shown in the unit impacts analysis, these conditions are expected to occur under part-load, low-temperature conditions (Case 6).

As it is reasonably likely that the other CTGs will be in operation while the new turbine is undergoing commissioning, the analysis of air quality impacts during commissioning included the existing units. Emission rates and stack parameters for all four turbines are shown in the Air Quality Technical Report, Appendix B, Table B-8. Modeled impacts during commissioning of the expansion CTG are summarized in Table 5.2-24.

**TABLE 5.2-24**
**MODELED IMPACTS DURING COMMISSIONING OF THE NEW EXPANSION CTG**

| Pollutant/Averaging Period | Modeled Concentration, :g/m$^3$ |
|---|---|
| $NO_x$ - 1-hour avg | 81.9 |
| CO - 1-hour avg | 398.5 |
| CO - 8-hour avg | 105.4 |

**5.2.5.4.4 <u>Ambient Air Quality Impacts from the Modified Facility</u>.** To determine a project's air quality impacts, the modeled concentrations are added to the maximum background ambient air concentrations and then compared to the applicable ambient air quality standards. The maximum background ambient concentrations are listed in the following text and tables. A discussion of why the data collected at these stations are representative of ambient concentrations in the vicinity of the project was provided above.

Table 5.2-25 presents the maximum concentrations of $NO_2$, CO, $SO_2$, $PM_{10}$, and $PM_{2.5}$ recorded between 2002 and 2004 from nearby monitoring stations.

**TABLE 5.2-25**
**MAXIMUM BACKGROUND CONCENTRATIONS, 2002-2004 (µg/m$^3$)**

| Pollutant | Averaging Time | 2001[a] | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|
| $NO_2$ | 1-hour | -- | 201.2 | 159.8 | 156.0 |
| | Annual | -- | 39.6 | 37.7 | 35.8 |
| $SO_2$[a] | 1-hour | 78 | n/a | n/a | n/a |
| | 3-hour | 39 | | | |
| | 24-hour | 13.1 | | | |
| | Annual | 5.3 | | | |
| CO | 1-hour | -- | 5,625 | 5,625 | 4,125 |
| | 8-hour | -- | 2,778 | 3,400 | 2,667 |
| $PM_{10}$ | 24-hour | -- | 100 | 110 | 95 |
| | Annual | -- | 49 | 48 | 44 |
| $PM_{2.5}$ | 24-hour[b] | -- | 73 | 59 | 62 |
| | Annual | -- | 22.8 | 16.8 | 15.5 |

a. No $SO_2$ data were collected in Kern County in 2002 or 2003.
b. $PM_{2.5}$ 24-hr average concentrations shown are 98$^{th}$ percentile values rather than highest values because compliance with the standard is based on 98$^{th}$ percentile readings.

Maximum ground-level impacts due to operation of the new turbine in combination with the existing PEF equipment are shown in Table 5.2-26. The startup modeling assumes that the new expansion CTG starts up simultaneously with the startup of one of the existing combined-cycle CTGs.

**TABLE 5.2-26**
**AIR QUALITY MODELING RESULTS FOR THE MODIFIED FACILITY (EXISTING + EXPANSION)**

| Pollutant | Averaging Time | Modeled Concentration (µg/m³) | |
|---|---|---|---|
| | | ISCST3/ CTSCREEN | Startup |
| $NO_2$ | 1-hour[a] | 59.6 | 204.0 |
| | Annual[b] | 2.4 | c |
| $SO_2$ | 1-hour[a] | 12.2 | d |
| | 3-hour | 13.1 | d |
| | 24-hour | 1.8 | d |
| | Annual | 0.4 | d |
| CO | 1-hour[a] | 87.3 | 1946.3 |
| | 8-hour | 56.0 | 268.5 |
| $PM_{2.5}/PM_{10}$ | 24-hour | 4.8 | d |
| | Annual | 2.0 | d |

a. Fire pump engine and emergency generator excluded for one-hour averaging period as these existing units will operate only in emergencies and will not routinely operate concurrently with CTGs.
b. Annual average $NO_2$ concentration is ozone limited using the Ambient Ratio Method and the national default conversion rate of 0.75.
c. Not applicable, because startup emissions are included in the modeling for annual average.
d. Not applicable, because emissions are not elevated above normal levels during startup.

These maximum modeled concentrations are combined with background ambient concentrations and compared with the state and federal ambient air quality standards in Table 5.2-27. Using the conservative assumptions described earlier, the results indicate that the PEF Expansion project will not cause or contribute to violations of any state or federal air quality standards, with the exception of the state and federal $PM_{10}$ and $PM_{2.5}$ standards. For these pollutants, existing concentrations already exceed the state and federal standards.

**5.2.5.4.5 Preconstruction Monitoring.** To ensure that the impacts from the new PEF combustion turbine will not cause or contribute to a violation of an ambient air quality standard or an exceedance of a PSD increment, an analysis of the existing air quality in the project area is necessary. If a source is subject to PSD review, EPA may require preconstruction ambient air quality monitoring data for the purposes of establishing background pollutant concentrations in the impact area. However, a new source or modification may be exempted from this requirement if the predicted air quality impacts of the source do not exceed the de minimis levels listed in Table 5.2-28. As the modeled ambient impacts of the proposed PEF Expansion project are below the preconstruction modeling de minimis levels, the preconstruction monitoring requirements are not applicable to the project.

**TABLE 5.2-27**
**MODELED MAXIMUM IMPACTS FROM FACILITY (EXISTING + EXPANSION)**

| Pollutant | Averaging Time | Maximum Facility Impact (µg/m$^3$) | Background (µg/m$^3$) | Total Impact (µg/m$^3$) | State Standard (µg/m$^3$) | Federal Standard (µg/m$^3$) |
|---|---|---|---|---|---|---|
| $NO_2$[a] | 1-hour[b] | 204.0 | 201.2 | 405.2 | 470 | - |
| | Annual | 2.4 | 39.6 | 42.0 | - | 100 |
| $SO_2$ | 1-hour[b] | 12.2 | 78 | 90 | 650 | - |
| | 3-hour | 13.1 | 39 | 52 | - | 1300 |
| | 24-hour | 1.8 | 13.1 | 15 | 109 | 365 |
| | Annual | 0.4 | 5.3 | 6 | - | 80 |
| CO | 1-hour[b] | 1,946.3 | 5,625 | 7,571 | 23,000 | 40,000 |
| | 8-hour | 268.5 | 3,400 | 3,669 | 10,000 | 10,000 |
| $PM_{10}$ | 24-hour | 4.8 | 110 | 115 | 50 | 150 |
| | Annual | 2.0 | 49 | 51 | 20 | 50 |
| $PM_{2.5}$ | 24-hour | 4.8 | 73 | 78 | -- | 65 |
| | Annual | 2.0 | 22.8 | 25 | 12 | 15 |

a. Maximum one-hour $NO_2$ impact shown occurs only during simultaneous startup of two turbines. Maximum impact during routine turbine operation will be approximately 60 µg/m$^3$.
b. Fire pump engine and emergency generator excluded for one-hour averaging period as these existing units will operate only in emergencies and will not routinely operate concurrently with CTGs.

**TABLE 5.2-28**
**EVALUATION OF PRECONSTRUCTION MONITORING REQUIREMENTS FOR PEF EXPANSION CTG**

| Pollutant | Averaging Time | Exemption Concentration (µg/m$^3$) | Maximum Modeled Concentration, Expansion CTG (µg/m$^3$) | Exceed Monitoring Threshold? |
|---|---|---|---|---|
| $NO_x$ | annual | 14 | 0.3 | No |
| $SO_2$ | 24-hr | 13 | 0.2 | No |
| CO | 8-hr | 575 | 51.4 | No |
| $PM_{10}$ | 24-hr | 10 | 0.9 | No |

With EPA's approval, a facility may rely on air quality monitoring data collected at District monitoring stations to satisfy the requirement for preconstruction monitoring. In such a case, in accordance with Section 2.4 of the USEPA PSD guideline, the last three years of ambient monitoring data may be used if they are representative of the area's air quality where the maximum impacts occur due to the proposed source.

The background data need not be collected on site, as long as the data are representative of the air quality in the subject area (40 CFR 51, Appendix W, Section 9.2). Three criteria are applied in determining whether the background data are representative: (1) location, (2) data quality, and (3) data currentness.[7] These criteria are defined as follows:

- Location: The measured data must be representative of the areas where the maximum concentration occurs for the proposed stationary source, existing sources, and a combination of the proposed and existing sources.
- Data quality: Data must be collected and equipment must be operated in accordance with the requirements of 40 CFR Part 58, Appendices A and B, and PSD monitoring guidance.
- Currentness: The data are current if they have been collected within the preceding three years and they are representative of existing conditions.

All of the data used in this analysis meet the requirements of Appendices A and B of 40 CFR Part 58, and thus all meet the criterion for data quality. With the exception of $SO_2$, for which no monitoring has been conducted in Kern County since 2001, all of the data have been collected within the preceding three years, and thus meet the criterion for currentness.

Ambient $NO_2$, CO, $SO_2$, $PM_{10}$, and $PM_{2.5}$ data are collected at various locations in Kern County. Ambient concentrations from monitoring stations in Bakersfield were used to characterize existing air quality in the project area. Until 2001, $SO_2$ was also monitored in Bakersfield. The concentrations monitored at California Avenue in Bakersfield are generally higher than the concentrations monitored at Golden State Highway, so the California Avenue data are used to represent existing background for $NO_2$, $PM_{10}$, and $PM_{2.5}$. CO data from the Golden State Highway monitoring station, located along Highway 99, are most representative of conditions at the project site.

**5.2.5.4.6 PSD Increment Consumption.** The Prevention of Significant Deterioration (PSD) program was established to allow emission increases (increments of consumption) that do not result in significant deterioration of ambient air quality in areas where criteria pollutants have not exceeded the National Ambient Air Quality Standards (NAAQS). For the purposes of determining applicability of the PSD program requirements, the following regulatory procedure is used.

- PEF facility-wide emissions are compared with regulatory significance thresholds to determine whether the facility is major and thus may be subject to PSD. If the facility

[7] Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD), EPA, 1987.

emissions exceed these thresholds, it is a major facility. Then the emissions increases due to the proposed modification are compared with the significance thresholds to determine whether the modification is major. The comparison in Table 5.2-29 indicates that PEF is a major facility and the expansion project is a major modification, so the proposed project is subject to PSD.

- If an ambient impact analysis is required, the analysis is first used to determine if the impact levels are significant. The determination of significance is based on whether the impacts exceed established significance levels shown in Table 5.2-30. If the significance levels are not exceeded, no further analysis is required.
- If the significance levels are exceeded, an analysis is required to demonstrate that the allowable increments will not be exceeded, on a pollutant-specific basis. Increments are the maximum increases in concentration that are allowed to occur above the baseline concentration. These PSD increments are also shown in Table 5.2-30.

**TABLE 5.2-29**
**PSD SIGNIFICANT EMISSIONS LEVELS**

| Pollutant | Existing PEF Facility Emissions (tpy) | PEF Expansion Emissions Increase (tpy) | PSD Significance Threshold (tpy) | Are Emissions from Expansion Significant? |
|---|---|---|---|---|
| $NO_x$ | 172.9 | 82.1 | 40 | Yes |
| $SO_2$ | 42.4 | 15.3 | 40 | No |
| VOC | 113.8 | 21.6 | 40 | No |
| CO | 610.5 | 285.7 | 100 | Yes |

**TABLE 5.2-30**
**PSD LEVELS OF SIGNIFICANCE**

| Pollutant | Averaging Time | Significant Impact Levels | Maximum Allowable Increments |
|---|---|---|---|
| $NO_2$ | Annual | 1 $\mu g/m^3$ | 25 $\mu g/m^3$ |
| $SO_2$ | 3-hour | 25 $\mu g/m^3$ | 512 $\mu g/m^3$ |
| | 24-Hour | 5 $\mu g/m^3$ | 91 $\mu g/m^3$ |
| | Annual | 1 $\mu g/m^3$ | 20 $\mu g/m^3$ |
| CO | 1-Hour | 2000 $\mu g/m^3$ | N/A |
| | 8-Hour | 500 $\mu g/m^3$ | N/A |
| $PM_{10}$ | 24-Hour | 5 $\mu g/m^3$ | 30 $\mu g/m^3$ |
| | Annual | 1 $\mu g/m^3$ | 17 $\mu g/m^3$ |

Table 5.2-29 shows that the proposed project will be a major modification to a major stationary source and will therefore be subject to PSD review for $NO_x$ and CO. Since the

SJVAPCD is a nonattainment area for $PM_{10}$, the project is not subject to PSD review for that pollutant.

The maximum modeled impacts from the expansion CTG are compared with the significance levels in Table 5.2-31. Since the modeled impacts of the proposed expansion turbine project are well below all applicable significant impact levels, no increments analysis is required.

**TABLE 5.2-31**
**COMPARISON OF MAXIMUM MODELED IMPACTS OF EXPANSION CTG AND PSD SIGNIFICANCE THRESHOLDS**

| Pollutant | Averaging Time | Maximum Modeled Impacts of Expansion CTG (μg/m³) | Significance Threshold (μg/m³) | Significant? |
|---|---|---|---|---|
| $NO_2$ | Annual | 0.3 | 1 | no |
| $SO_2$ | 3-Hour | 0.9 | 25 | no |
| | 24-Hour | 0.2 | 5 | no |
| | Annual | 0.1 | 1 | no |
| CO | 1-Hour | 391 | 2000 | no |
| | 8-Hour | 51 | 500 | no |

**5.2.5.4.7 Air Quality Related Values.** The PSD regulations require an assessment of the impacts, including visibility, of major sources on Air Quality Related Values (AQRVs) in Class I areas within 100 kilometers of the project site. The nearest Class I area is the San Rafael Wilderness Area, which is located approximately 73 kilometers from the project site. The San Rafael Wilderness Area is located in the Los Padres National Forest. Figure 5.2-7 shows this area with respect to the project site. PSD is applicable to $NO_2$, CO, and $SO_2$ for this project. PSD is not applicable to $PM_{10}$, for which the SJVAPCD has been designated a non-attainment area. Emissions of CO are not generally a concern, and are not included in the AQRV analysis. However, $PM_{10}$ emissions were included in the analysis.

AQRVs may also include terrestrial resources and aquatic resources, and are specific to each Class I area. The AQRV for each Class I area is determined by the Federal Land Manager (FLM). The FLM for the San Rafael Wilderness Area is the US Department of Agriculture, Forest Service (USFS). The FLM has the legal responsibility for (1) identifying and describing AQRVs in each Class I area, and (2) defining the limits of acceptable change (LAC). Air quality-related impacts, including regional haze and acid deposition, are addressed in this section.

The analysis of impacts on AQRVs was performed using the CALPUFF modeling system to demonstrate that AQRVs in Prevention of Significant Deterioration (PSD) Class I areas such as scenic vistas (based on CALPUFF modeled visibility impairment) and sensitive plants and ecosystems (based on CALPUFF modeled deposition rates of nitrogen- and sulfur-containing species) will not be threatened as a result of the proposed project. The FLMs have established AQRV screening thresholds. If the maximum impacts are less than these screening thresholds, then further analyses will typically not be required. However, should the impacts exceed the screening thresholds, then more refined analysis may be required, depending upon the magnitude and frequency of occurrence, as evaluated on a case-by-case basis by the FLM. Since the analysis presented here demonstrates that none of the screening thresholds will be exceeded as a result of the PEF Expansion project, no additional analyses are necessary.

Potential project impacts on regional haze and acid deposition were quantified using the CALPUFF Modeling System operated in a screening mode. The modeling followed guidance provided by the FLMs' Air Quality Related Values (AQRV) Workgroup (FLAG) Phase I report (U.S. Forest Service et. al., 2000), the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report, USFS guidance on nitrogen deposition analysis thresholds (January 2002) and particle speciation (November 2002), and additional guidance provided in personal communications with the USFS.

**<u>Analysis of Impacts on Regional Haze</u>.** In most visibility analyses, two separate models are used to quantify the visibility impacts. VISCREEN is used to assess plume blight (coherent plume analysis) for near field impacts (i.e., impacts less than 50 km from the project site), and CALPUFF is used to quantify regional haze impacts for distant impacts (i.e., impacts greater than 50 km the project site).[8] Since the San Rafael Wilderness is greater than 50 km from the PEF Expansion Project, only a CALPUFF analysis is required.

Visibility is usually characterized by either visual range (VR) (the greatest distance that a large dark object can be seen) or by the light-extinction coefficient (b) (the attenuation of light per unit distance due to scattering and absorption by gases and particulates in the atmosphere). The parameters are related as follows:

$$VR(km) = \frac{3{,}912}{b(Mm^{-1})} \qquad \text{(Equation 1)}$$

where visual range (VR) is expressed in kilometers (km) and extinction coefficient (b) in inverse megameters ($Mm^{-1}$). The basis of the regional haze assessment is a calculation of the change in the light extinction coefficient.

Visibility impacts from the operations of the PEF Expansion CTG may be caused by atmospheric aerosols in the fine particulate fraction ($PM_{2.5}$) but not the coarse fraction

[8] Nitrogen and sulfur deposition are analyzed using CALPUFF for all Class I areas, regardless of distance.

($PM_{10}$); that is, nitrates (conversion from $NO_2$), sulfates (from $SO_2$), and organic aerosols (from particulates). Therefore, the extinction coefficient from the proposed source ($b_{source}$) is the sum of the scattering coefficients due to nitrates ($b_{NO3}$), sulfates ($b_{SO4}$), and organic aerosols ($b_{OC}$):

$$b_{source} = b_{NO3} + b_{SO4} + b_{OC} \qquad \text{(Equation 2)}$$

where: $b_{NO3} = 3\ [NH_4NO_3]f(RH)$

$b_{SO3} = 3\ [(NH_4)_2SO_4]f(RH)$

$b_{OC} = 4\ [OC]$

CALPUFF is capable of simulating the chemical transformation of pollutants which contribute to regional haze and atmospheric deposition such as the transformation of sulfur dioxide to ammonium sulfate – a fine particle that effectively scatters light, thereby increasing haze. CALPUFF requires the user to provide background concentrations of other pollutants (e.g., ozone and ammonia) which participate in the chemical reactions in order to accurately quantify the impacts. For ozone ($O_3$), an average concentration of 56.3 ppb was used, based on a recommendation from the U.S. Forest Service. For ammonia ($NH_3$), the recommended value of 0.5 ppb for forest regions was used, based on IWAQM and USFS guidance.

The surface data required by CALPUFF for screening analyses includes pressure, relative humidity, precipitation, and horizontal global radiation data, which are available for 1961 through 1990 on the National Climatic Data Center (NCDC) Solar and Meteorological Surface Observation Network (SAMSON) CD dataset. The nearest appropriate SAMSON surface station to the project is the Fresno Airport, located at 36.77° North latitude and 119.72° West longitude in Time Zone 8 (PST). Five years of surface data (1986 to 1990) were used for the modeling analyses with CALPUFF in screening mode (i.e., single station of surface data). Hourly interpolation of measured twice-daily mixing heights for the Desert Rock, NV, monitoring station was used. The extended ISCST3 meteorological dataset was generated with PCRAMMET using wet deposition and precipitation data options. The Fresno SAMSON surface met data was used in place of the locally-collected Bakersfield SAMSON surface met data since Bakersfield met data were typically not collected for eight consecutive nighttime hours.

In accordance with IWAQM guidance, three receptor rings were created for the CALPUFF screening analyses. The diameters of the rings correspond to the nearest, middle, and farthest distances from the project site to a location within the Class I area. Each receptor ring consists of 1 degree, equally-spaced receptors at an elevation equal to the mean elevation of the transecting arc in the Class I area. The receptor rings extend 360 degrees around the Class I area and are intended to characterize the potential range of impacts within the Class I area.

CALPOST options include the formation of hygroscopic species based on seasonal relative humidity [f(rh)] values and background concentrations of hygroscopic and non-hygroscopic species as presented for San Rafael Wilderness Area in the FLAG Phase I report. In accordance with IWAQM guidance for screening procedures, maximum 24-hour sulfate, nitrate and nitric acid emission rates were used. Because hourly relative humidity data for the Fresno met station were available, hourly values were used for the screening analysis. However, in accordance with comments received from the FLM on an earlier, similar analysis, a maximum RH value of 98% was assumed for any individual hour (i.e., all hourly RH values greater than 98% were set to 98%).

The IWAQM Phase 2 document states that elemental carbon (soot) contributes to regional haze, with an extinction efficiency of 10.0, as does organic carbon with an efficiency of 4.0. A document provided by FLMs (Recommendations regarding inclusion of Elemental Carbon and Organic Carbon fraction of $PM_{10}$ emissions in Class I visibility modeling analysis) states that this newer guidance will apply to all PSD permit applications submitted after September 5$^{th}$, 2002. This new FLM guidance has been followed in the analysis to be prepared for the PEF Expansion project. The calculation of effective extinction is provided in the Air Quality Technical Report, Appendix B, Attachment B-1.

The maximum model-predicted light extinction ($B_{ext}$), background light extinction, and percent change in light extinction at the San Rafael Wilderness Class I area are shown in Table 5.2-32. The background value was calculated by CALPUFF/CALPOST, as opposed to the value reported in the FLAG Phase I report. The maximum model-predicted light extinction is 0.28%, which is well below the 5% threshold considered significant.

**TABLE 5.2-32**
**MODEL-PREDICTED CHANGE IN LIGHT EXTINCTION**

| Class I Area | Model-Predicted $B_{ext}$ | Background $B_{ext}$ | % Change in $B_{ext}$ |
|---|---|---|---|
| San Rafael Wilderness | 0.044 | 15.860 | 0.31 |

In summary, the regional haze analysis performed for impacts in the San Rafael Wilderness resulted in predicted screening-level visibility impacts that are well below the five percent significance threshold change in the light extinction coefficient. Therefore, the potential visibility impacts in this Class I area as a result of the proposed PEF Expansion project have been demonstrated to be insignificant pursuant to USFS criteria.

**Acid Deposition Impacts.** Acid deposition (both wet and dry) is quantified by modeling the deposition rates of nitrogen- and sulfur-containing species. Emission rates of $NO_X$, $SO_2$, and $SO_4$ are input into CALPUFF, which in turn calculates the deposition rates of secondary species. The $SO_2$ and $PM_{10}$ emissions were adjusted to remove the sulfate component; emissions of sulfates ($SO_4$) were input as a separate species into the model. Sulfate emissions were estimated based upon manufacturer and performance data. In accordance with IWAQM guidance, annual emission rates were used for the acid deposition analyses.

In the absence of deposition monitoring data for the San Rafael Wilderness, the data from Pinnacles National Monument, which is also located in the Los Padres National Forest, was assumed to be representative and used as background for the San Rafael Wilderness. Dry and wet deposition rates for Pinnacles National Monument monitoring site PIN414 were obtained from the Clean Air Status and Trends Network (CASTNet) website at http://www.epa.gov/castnet. Data were available from 1996 through 2001 for three nitrogen containing species: ammonium ($NH_4$), nitrate ($NO_3$), and nitric acid ($HNO_3$). Nitrogen deposition from these species was determined by correcting the deposition rate of each stoichiometrically. These background values are also provided in the Air Quality Technical Report, Appendix B, Attachment B-1.

The species modeled in the CALPUFF program are $HNO_3$, $NO_3$, $NO_x$, $SO_2$ and $SO_4$. Dry and wet flux output files created by CALPUFF were processed in POSTUTIL to obtain a combined total flux output file. In POSTUTIL, nitrogen and sulfur deposition fluxes were computed using a weighted sum of the deposition fluxes of all of the species computed and stored from the CALPUFF model run. All of the following contribute to the total nitrogen mass: $SO_4$ in the form of ammonium sulfate [$(NH_4)_2SO_4$]; $NO_x$ as $NO_2$; $HNO_3$; and $NO_3$ in the form of ammonium nitrate [$(NH_4)NO_3$]. Only $SO_2$ and $SO_4$ contribute to the total sulfur mass. The total amount of nitrogen or sulfur that one gram of each of the species modeled contributes was calculated using molecular weight ratios.

The output file from the POSTUTIL program was processed in the CALPOST program to obtain total nitrogen and total sulfur deposition rates. A scaling factor was employed which converted the deposition rates from grams per square meter per second ($g/m^2$-sec) to kg/ha-yr. The maximum model-predicted nitrogen and sulfur deposition rates calculated for the San Rafael Wilderness Class I area are 0.001 kg/ha/yr and 0.0004 kg/ha/yr, respectively.

New guidance on Deposition Analysis Thresholds (DATs) was adopted by the National Park Service and US Fish and Wildlife Service in January 2002. This new guidance recommended DATs of 0.005 kg/ha-yr for both sulfur and nitrogen deposition in the Western United States. The deposition rates reported above are well below these thresholds.

**PSD Increments in the Class I Area.** Maximum 3-hour, 24-hour and annual $SO_2$ emission rates, maximum 24-hour and annual $PM_{10}$ emission rates, and maximum annual $NO_x$ emission rates were used for modeling potential increment consumption in the Class I area. The ISCST3 model was used with meteorological data collected at Bakersfield and receptors within the Class I area to determine potential impacts of the PEF Expansion project on Class I increments. The modeling results, reported in Table 5.2-33 below, demonstrate that the impacts of the PEF Expansion project will be well below the Class I increment thresholds and below any significance thresholds.

**TABLE 5.2-33**
**CRITERIA POLLUTANT IMPACTS IN THE SAN RAFAEL WILDERNESS**

| Pollutant | Averaging Prd | Max. Modeled Concentration, µg/m³ | Class I Increment, µg/m³ | Modeled Impact as % of Increment |
|---|---|---|---|---|
| $NO_2$ | Annual | 0.0023 | 2.5 | <0.1% |
| $SO_2$ | 3 hours | 0.029 | 25 | 0.1% |
| | 24 hours | 0.0047 | 5 | <0.1% |
| | Annual | 0.00041 | 2 | <0.05% |
| $PM_{10}$ | 24 hours | 0.0030 | 10 | <0.05% |
| | Annual | 0.00026 | 5 | <0.01% |

**5.2.5.4.8 AQRV Impacts – Other.** Impacts of the proposed project on other AQRVs, including vegetation, are analyzed in Sections 5.4 and 5.6 (Agriculture and Soils and Biological Resources, respectively).

**5.2.5.4.9 Growth Analysis.** The additional operations personnel required to staff the new turbine will not cause significant secondary impacts in the project area. In addition, the energy to be supplied by the existing PEF and PEF Expansion is not growth inducing, but rather, responds to a need for power that would otherwise be generated by another supplier to the power grid. Therefore, the combined facility's contribution to unforeseen future growth in the project area is insignificant.

### 5.2.5.5 Screening Health Risk Assessment

The screening health risk assessment (SHRA) was conducted to determine expected impacts on public health of the noncriteria pollutant emissions from the facility. The assessment included all of the existing units at PEF as well as the new turbine. The SHRA was conducted in accordance with the OEHHA's "Air Toxics Hot Spots Program Guidance Manual For Preparation Of Health Risk Assessments" (October 2003). The SHRA estimated the offsite cancer risk to the maximally exposed individual (MEI) and to maximally exposed workers, as well as indicated any adverse effects of non-carcinogenic compound emissions. The CARB/OEHHA HARP computer program was used to evaluate multipathway exposure to toxic substances. Because of the conservatism (overprediction) built into the established risk analysis methodology, the actual risks will be lower than those estimated. Both the incremental risks due to the new turbine and the total risks from the modified facility were evaluated.

A health risk assessment requires the following information:

- Carcinogenic potency values for any carcinogenic substances that may be emitted
- Noncancer Reference Exposure levels (RELs) for determining non-carcinogenic health impacts
- One-hour and annual average emission rates for each substance of concern
- The modeled maximum offsite concentration of each of the pollutants emitted

The SHRA uses the HARP model as specified by the California Office of Environmental Health Hazard Assessment (OEHHA) to evaluate carcinogenic risk for a variety of exposure scenarios. All of the pollutant cancer risks are assumed to be additive.

An evaluation of the potential noncancer health effects from long-term (chronic) and short-term (acute) exposures has also been included in the SHRA. Many of the carcinogenic compounds are also associated with noncancer health effects and are therefore included in the determination of both cancer and noncancer effects. RELs are used as indicators of potential adverse health effects. RELs are generally based on the most sensitive adverse health effect reported and are designed to protect the most sensitive individuals. However, exceeding the REL does not automatically indicate a health impact. The OEHHA reference exposure levels were used to determine any adverse health effects from noncarcinogenic compounds. A hazard index for each noncancer pollutant is then determined by the ratio of the pollutant annual average concentration to its respective REL for a chronic evaluation. The individual indices are summed to determine the overall hazard index for the project. Because noncancer compounds do not target the same system or organ, this sum is considered conservative. The same procedure is used for the acute evaluation.

The SHRA results are compared with the established risk management procedures for the determination of acceptability. The established risk management criteria include those listed below.

- If the potential increased cancer risk is less than one in a million, the facility risk is considered not significant.

- If the potential increased cancer risk is greater than one in a million but less than ten in a million and Toxics-Best Available Control Technology (TBACT) has been applied to reduce risks, the facility risk is considered acceptable.
- If the potential increased cancer risk is greater than ten in a million and there are mitigating circumstances that, in the judgment of a regulatory agency, outweigh the risk, the risk is considered acceptable.
- For noncancer effects, total hazard indices of one or less are considered not significant.
- For a hazard index greater than one, OEHHA and the reviewing agency conduct a more refined review of the analysis and determine whether the impact is acceptable.

The SHRA includes the noncriteria pollutants listed above in Table 5.2-22. The receptor grid described earlier for criteria pollutant modeling was used for the SHRA. The SHRA results for the PEF are presented in Table 5.2-34, and the detailed calculations are provided in the Air Quality Technical Report, Appendix C. The locations of the maximum modeled risks are shown in Appendix C, Figure C-1.

**TABLE 5.2-34**
**SCREENING HEALTH RISK ASSESSMENT RESULTS**

| | Expansion CTG Alone | Existing Facility[a] | Existing Facility plus Expansion CTG[a] |
|---|---|---|---|
| Cancer Risk to Maximally Exposed Individual[b] | 0.08 in one million | 2.2 in one million | 2.2 in one million |
| Cancer Risk to Maximally Exposed Worker | 0.02 in one million | 0.3 in one million | 0.3 in one million |
| Acute Inhalation Hazard Index | 0.03 | 0.35 | 0.35 |
| Chronic Inhalation Hazard Index | 0.004 | 0.03 | 0.03 |

a. Includes three existing CTGs, emergency generator and Diesel fire pump engine.
b. Value shown reflects high end point estimate for the MEI. 70-year cancer risk estimates range from 0.03 to 0.08 in one million for the expansion turbine alone and from 1.5 to 2.2 in one million for the entire facility. The Diesel fire pump engine is responsible for the majority of the cancer risk; see Appendix C.

The screening HRA results indicate that the acute and chronic hazard indices are well below 1.0, so are not significant. The maximum 70-year cancer risk from the expansion CTG alone is 0.08 in one million, well below the one in one million level. The screening HRA results indicate that, overall, the PEF expansion project will not pose a significant health risk at any location.

#### 5.2.5.6 Construction Impacts Analysis

Emissions due to the construction phase of the project have been estimated, including an assessment of emissions from vehicle and equipment exhaust and the fugitive dust generated from material handling. A dispersion modeling analysis was conducted based on these emissions. A detailed analysis of the emissions and ambient impacts is included in the Air Quality Technical Report, Appendix D. The results of the analysis indicate that the maximum construction impacts will be below the state and federal standards for all the criteria pollutants emitted. The best available emission control techniques will be used. The PEF Expansion project construction site impacts are not unusual in comparison to most construction sites; construction sites that use good dust suppression techniques and low-emitting vehicles typically do not cause violations of air quality standards.

Combustion Diesel $PM_{10}$ emission impacts have also been evaluated to demonstrate that the carcinogenic risk from construction activities will be below one in one million at all receptors. This risk screening analysis is also included in the Air Quality Technical Report, Appendix D.

### 5.2.6 Consistency with Laws, Ordinances, Regulations, and Standards

#### 5.2.6.1 Consistency with Federal Requirements

The San Joaquin Valley Air Pollution Control District (District) has been delegated authority by the USEPA to implement and enforce most federal requirements that may be applicable to the PEF Expansion project, including the new source performance standards and new source review for nonattainment pollutants.[9] Compliance with the District regulations ensures compliance and consistency with the corresponding federal requirements as well. The new turbine will also be required to comply with the Federal Acid Rain requirements (Title IV). Since the District has received delegation for implementing Title IV through its Title V permit program, PEF will modify its District Title V permit that imposes the necessary requirements for compliance with the Title IV Acid Rain provisions.

#### 5.2.6.2 Consistency with State Requirements

State law sets up local air pollution control districts and air quality management districts with the principal responsibility for regulating emissions from stationary sources. As discussed above, PEF is under the local jurisdiction of the District, and compliance with District regulations will ensure compliance with state air quality requirements.

[9] As discussed in Section 5.2.4.1.1, EPA retains the authority to implement the PSD program in the SJVAPCD.

### 5.2.6.3 Consistency with Local Requirements: San Joaquin Valley Air Pollution Control District (District)

The District has been delegated responsibility for implementing local, state, and federal air quality regulations in the eight counties in the San Joaquin Valley.[10] The PEF Expansion project is subject to District regulations that apply to modified sources of emissions, to the prohibitory regulations that specify emission standards for individual equipment categories, and to the requirements for evaluation of impacts from toxic air pollutants. The following sections include the evaluation of facility compliance with the applicable District requirements.

Under the regulations that govern new sources of emissions, the PEF Expansion project is required to secure a preconstruction Determination of Compliance from the District (Rule 2201, Section 5.8), as well as demonstrate continued compliance with regulatory limits when the new equipment becomes operational. The preconstruction review includes demonstrating that the new combustion turbine will use best available control technology (BACT) and will provide any necessary emission offsets.

**5.2.6.3.1 Best Available Control Technology.** Best Available Control Technology (BACT) must be applied to any new or modified source resulting in an emissions increase exceeding any SJVAPCD BACT threshold. Applicable BACT levels are shown in Table 5.2-35. SJVAPCD Rule 2201 requires PEF to apply BACT to any source that has an increase in emissions of $NO_x$, VOC, $SO_x$, CO, and $PM_{10}$ (criteria pollutants) in excess of 2.0 pounds per highest day. Since the only source affected by the proposed modification is the new turbine, the maximum daily emissions from the turbine are compared with the BACT thresholds to determine BACT applicability.

**TABLE 5.2-35**
**SJVAPCD BACT EMISSION THRESHOLDS**

| Pollutant | Threshold | Expansion CTG Emissions |
|---|---|---|
| PM | 2 lb/day | 216 lb/day |
| $NO_x$ | 2 lb/day | 450 lb/day |
| $SO_2$ | 2 lb/day | 84 lb/day |
| VOC | 2 lb/day | 355 lb/day |
| CO | 100 tpy | 285.7 tpy |

[10] The eastern portion of Kern County is under the jurisdiction of the Kern County Air Pollution Control District.

BACT for the applicable pollutants was determined by reviewing the District BACT Guidelines Manual, the South Coast Air Quality Management District BACT Guidelines Manual, the most recent Compilation of California BACT Determinations, CAPCOA (2nd Ed., November 1993), and USEPA's BACT/LAER Clearinghouse. A summary of the review is provided in the Air Quality Technical Report, Appendix E. For the combustion turbines, the District considers BACT to be the most stringent level of demonstrated emission control that is feasible. The PEF Expansion turbine will use the BACT measures discussed below.

As a BACT measure, the PEF Expansion project will limit the fuels burned in the new turbine to natural gas, a clean burning fuel. Burning of liquid fuels in the combustion turbine combustors would result in greater criteria pollutant emissions than if the units burned only gaseous fuels. This measure acts to minimize the formation of all criteria air pollutants.

BACT for $NO_x$ emissions from the combustion turbine will be the use of low $NO_x$ emitting equipment and add-on controls. The PEF Expansion will use selective catalytic reduction (SCR) and dry low-$NO_x$ combustion to reduce $NO_x$ emissions to 2.5 ppmvd $NO_x$, corrected to 15 percent $O_2$. The District BACT guidelines indicate that technologically feasible BACT from large, simple-cycle combustion turbines (≥50 MMBtu/hr heat input) is an exhaust concentration of 2.5 ppmvd $NO_x$, corrected to 15 percent $O_2$; therefore, the new turbine will meet the BACT requirements for $NO_x$. The District BACT Guideline determination for $NO_x$ from combustion turbines is shown in Appendix E.

BACT for CO emissions will be achieved by using good combustion practices to achieve CO emissions of 6.0 ppmvd, corrected to 15 percent $O_2$, on a 3-hour average basis. Recent District BACT determinations indicate that BACT from large, simple-cycle combustion turbines (≥50 MMBtu/hr heat input) is 6 ppmvd CO, corrected to 15 percent $O_2$. A review of recent BACT determinations for CO from combustion turbines is provided in Appendix E.

BACT for POC emissions will be achieved by use of good combustion practices in the combustion turbines. BACT for POC emissions from combustion devices has historically been the use of best combustion practices. POC emissions leaving the stacks will not exceed 2.0 ppmvd, corrected to 15 percent oxygen. This level of emissions is consistent with recent BACT determinations for similar projects.

For the turbine, BACT for $PM_{10}$ is best combustion practices and the use of gaseous fuels. District BACT Guideline 3.4.7 specifies BACT for $SO_2$ for simple cycle combustion turbines with an output rating of ≥ 50 MW as the exclusive use of clean-burning PUC regulated natural gas with a sulfur content of < 0.75 grains per 100 scf. The proposed turbine will burn exclusively PUC-regulated natural gas with an expected average sulfur content of 0.75 grains per 100 scf, which will result in minimal $SO_2$ emissions.

**5.2.6.3.2 Emission Offsets.** A new or modified facility with a stationary source NSR balance exceeding the SJVAPCD offset thresholds shown in Table 5.2-36. PEF must offset all emissions increases at a ratio that varies according to the distance between the facility and the source of the offsets.

**TABLE 5.2-36**
**SJVAPCD OFFSET EMISSION THRESHOLDS**

| Pollutant | Threshold, lb/yr | Existing Facility Emissions, lb/yr | Expansion CTG Emissions, lb/yr |
|---|---|---|---|
| $NO^x$ | 20,000 | 344,484 | 164,250 |
| $SO_2$ | 54,730 | 84,780 | 30,616 |
| CO[a] | 200,000 | 1,220,166 | 471,492 |
| VOC | 20,000 | 227,619 | 43,154 |
| PM | 29,200 | 236,462 | 78,840 |

a. In attainment areas. CO emissions in nonattainment areas subject to 30,000 lb/yr offset threshold.

The District new source review rule requires project denial if $SO_2$, $NO_2$, $PM_{10}$, or CO air quality modeling results indicate emissions will interfere with the attainment or maintenance of the applicable ambient air quality standards or will exceed PSD increments. The modeling analyses presented in Section 5.2.5.3 of the application show that facility emissions will not interfere with the attainment or maintenance of the applicable air quality standards.

Emissions offset requirements for $NO_x$, VOC, $SO_2$, and $PM_{10}$ are shown in Table 5.2-37 below. Appendix F, Table F-1 of the Air Quality Technical Report shows the ERCs that will be provided for the project. $NO_x$ ERCs will be used for offsetting $PM_{10}$ emissions increases, in accordance with Rule 2201 Section 4.13.3.2, at the ratio of 2.72:1 (including distance) that was previously approved for the PEF project.

**TABLE 5.2-37**
**FACILITY OFFSET REQUIREMENTS**

| Pollutant | Net Increase in Emissions (lb/yr) | Required Offset Ratio[a] | Offsets Required (lb/yr) |
|---|---|---|---|
| $NO_x$ | 164,250 | 1.5 | 246,375 |
| VOC | 43,154 | 1.5 | 64,732 |
| $SO_2$ | 30,616 | 1.5 | 45,924 |
| $PM_{10}$ | 78,840 | 1.5 | 118,260 |

a. Based on assumption that ERCs are obtained from sources more than 15 miles away

The federal PSD rules also require applicants to demonstrate that emissions from a project located within 10 km (6.2 miles) of a Class I area will not cause or contribute to the exceedance of any national ambient air quality standard or any applicable Class I PSD increment. Because the nearest Class I areas, San Rafael and Dome Land Wilderness Areas, are more than 10 km from PEF, this section is not applicable to the proposed facility.

**5.2.6.3.3 SJVAPCD Prohibitory Rules.** The general prohibitory rules of the SJVAPCD applicable to the project include the following:

- Rule 4001 – NSPS Subpart GG: As discussed above, compliance with the Subpart GG requirements has already been demonstrated.
- Rule 4002 – National Emissions Standards for Hazardous Air Pollutants: The requirements of this rule apply to the project; however, since the facility will continue to be a non-major source of HAPs, no action is necessary to demonstrate continued compliance.
- Rule 4101 – Visible Emissions: Prohibits visible emissions as dark or darker than Ringelmann No. 2 for periods greater than three minutes in any hour. The existing facility permit limits the visible emissions from the turbine lube oil vents (5%) and exhaust stacks (20%). The proposed simple cycle expansion CTG is expected to be able to comply with these limitations.
- Rule 4102 – Nuisance: Prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or that damage business or property. The engineering evaluation for the original permit indicated that the equipment maintenance required by the permit conditions is expected to ensure compliance with this rule, and the proposed expansion CTG is expected to be subject to the same required maintenance.
- Rule 4201 – Particulate Matter Emission Standards: Prohibits PM emissions in excess of 0.1 grains per dry standard cubic foot (gr/dscf). As shown in Table A-1 of the Air Quality Technical Report, the proposed $PM_{10}$ emission rate for the PEF expansion CTG will limit PM emissions to well below 0.1 gr/dscf.
- Rule 4703 – Stationary Gas Turbines: Limits $NO_x$ and CO emissions from stationary gas turbines to 9 ppm (@15 percent $O_2$, corrected for efficiency) and 200 ppm, respectively. The Tier 2 $NO_x$ limit, effective April 30, 2008, will require the CTGs to meet a $NO_x$ limit of 3 ppm. The $NO_x$ and CO limits of 2.5 ppm and 6 ppm, respectively, will assure compliance with the requirements of this rule.
- Rule 4801 – Sulfur Compounds: Prohibits sulfur compound emissions, calculated as $SO_2$, in excess of 0.2 percent (2,000 ppm) from any source. The use of natural gas in the expansion turbine will assure compliance with this rule.

- Rule 8011 – Fugitive Dust Administrative Requirements for Control of $PM_{10}$: Sets forth definitions, applicability and administrative requirements for anthropogenic sources of $PM_{10}$.
- Rule 8021 – Fugitive Dust Requirements for Control of $PM_{10}$ from Construction, Demolition, Excavation and Extraction Activities: Limits fugitive dust emissions from construction, demolition, excavation and related activities. The proposed mitigation conditions for the construction period will ensure compliance with this rule.
- Rules 8031, 8041, 8051, 8061, 8071 and 8081 – Fugitive Dust Control: These rules control the emissions of fugitive dust from facility operations. The proposed mitigation conditions for the construction period will ensure compliance with these rules.

### 5.2.7 Cumulative Air Quality Impacts Analysis

An analysis of potential cumulative air quality impacts that may result from the proposed combustion turbines and other reasonably foreseeable projects is generally required when project impacts are significant.

As discussed in Section 3.1, no urban-type development is expected within a six-mile radius of the project. The area surrounding the project is undeveloped, vegetated with non-native grassland, and used for cattle grazing. To ensure that potential cumulative impacts are adequately considered, the ambient air quality analysis included an evaluation of the operation of the PEF Expansion combined with the existing power plant.

### 5.2.8 Mitigation

Mitigation will be provided for all emissions increases from the project in the form of offsets and the installation of BACT, as required under District regulations. The offsets to be provided for the project are shown in the Air Quality Technical Report, Appendix F.

### 5.2.9 References

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